ENGINEERING NEWS-RECORD

AUGUST 27, 1942

pairing Tractor Parts By Welding

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Planning Formwork or Economical Re-use

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How Plant Roads Can Speed War Jobs

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Graphical Analysis of ultiple Reservoir Flow

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Reducing Bridge Pier Veight With Sand Fill

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ading part of a 5-ton dynamite arge to blast a road through the ntucky hills (see page 69).

AUG 31 1942

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ENGINEERING NEWS-RECORD

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Vol. 129 AUGUST 27, 1942 No. 9

COMING NEXT

• Of special interest to waterworks men are three articles relating to supply, rehabilitation and maintenance. One of these describes the adaptation of oil-drilling instruments and procedures in the development of groundwater supplies. Another outlines the methods by which a cement lining was applied to large diameter cast-iron pipe already installed, and the third tells how Los Angeles tests water meters on a mass-production basis—160 of them with a single setting!

• Constructing 4,000 concrete foundation footings, many of them in 20 degree below zero weather, for 150 army barracks, presented a difficult problem. The winter hazards incident to the job were satisfactorily overcome by the use of metal stovepipe, and even cardboard for forms to expedite the work. Concrete pouring procedure is given.

• Getting More Production from Truck Mixers—a timely article that offers many suggestions from manufacturers, distributors and commercial users, items of vital importance in speeding up concrete mixing operations and containing valuable tips on equipment maintenance.

LOOKING AHEAD

• Making a river run backwards was only one of the unorthodox procedures that were resorted to in getting water to the vital Hampton Roads area of Virginia where war demands have jumped consumption 300 percent. Lacking everything but ingenuity, the engineers and contractors on the new supply facilities for Norfolk, Newport News and Portsmouth have outwitted time and materials shortages to bring water into these cities. Strategy and Tactics on a Wartime Waterworks Project properly titles this story.

• Since Pearl Harbor, the problem of protecting naval establishments against air attack has become vitally necessary. One of the most important phases of the problem has been that of providing air-raid shelters for navy personnel. Several types have been developed, but the most advanced design uses walls of concrete block and a concrete slab floor and roof, all three elements tied together with continuous reinforcing rods. A forthcoming article will describe these shelters.

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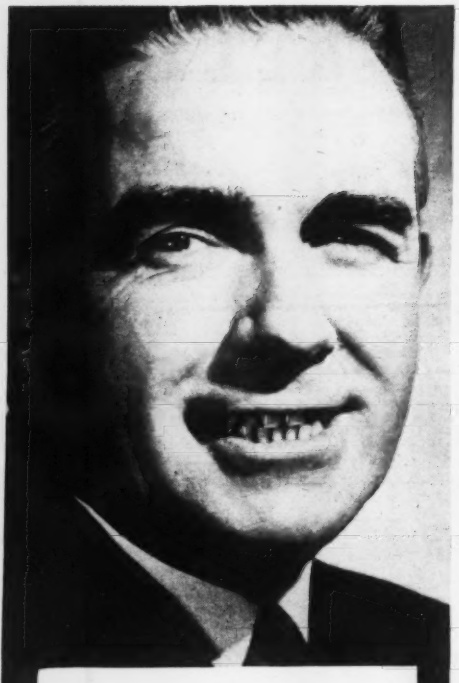


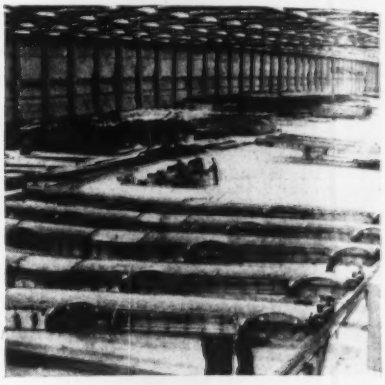
Things happen on an assembly line when you get LIGHT FROM YOUR FLOOR

IF YOUR FLOORS ARE WHITE, YOUR PLANT GETS MORE LIGHT

WAR PLANTS GET RID OF SHADOWS IN WORK AREAS

... with a floor that reflects light!

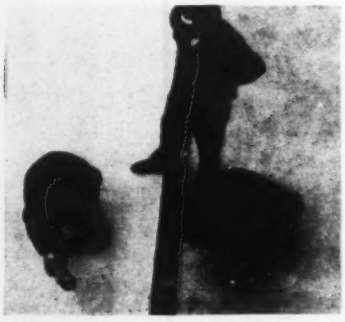
White Cement floors increase the intensity of illumination throughout plants and conserve critical materials. In addition, they provide more light on the underside of assemblies.



● *White cement floors speed war production by lighting up dark areas under wings on assembly line of one of Uncle Sam's larger aircraft plants.*

ENGINEERS have found a new way to increase light intensity. And the answer lies right under your feet as you walk along the assembly line.

FLOORS ARE THE NEW SOURCE OF LIGHT—white cement floors that absorb less and reflect more light—floors that retain a high reflection value indefinitely. In one factory, they reflect 60% more light than the gray cement floor in the same plant, and increase lighting intensity on a vertical plane more than 20%.



● *The white cement floor (left) reflects 60% more light than the gray cement floor (right) in this plant. This increased lighting intensity on a vertical plane more than 20%.*

IN AIRPLANE PLANTS—AT BOEING, CONSOLIDATED, DOUGLAS, AND NORTH AMERICAN—these white cement floors help to keep production in high gear. Employees work easily on the undersides of wings and fuselages with less strain and fatigue. Accidents are fewer. Morale is higher. Planes roll out faster to help win the war.

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ENR-P-9

LIGHT-REFLECTING FLOORS
MADE WITH ATLAS WHITE CEMENT

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • AUGUST 27, 1942 • VOLUME 129 • NUMBER 9

Power expansion program cut in half by WPB procedure

Program that envisioned expansion of 9,600,000 kw is cut to 5,500,000 with new work taking most of curtailment. Move is seen as concentration on munitions

Carrying out a basic policy of holding all sorts of capacity expansion to a minimum and concentrating available resources on actual munitions production, the War Production Board this week announced that it is scaling down the 9,600,000-kw program of expanded power generating facilities. The revised program grants high priorities to projects totalling 5,500,000 kw. Of this, 3,400,000 kw is in private utility projects, mostly steam, and 2,100,000 kw in public projects, mostly hydro.

Procedure, in most cases, was to eliminate recently started projects in favor of those well along toward completion. This was done in the case of the Bureau of Reclamation, when WPB two weeks ago (*ENR*, Aug. 13, p. 201) made public a list of ratings for reclamation projects which were considered very favorable, despite the fact that Anderson Ranch and Davis Dams are to be abandoned. WPB granted high ratings on a substantial program of reclamation projects now under way, the bulk of it consisting of additional generator installations at dams now largely completed.

Shasta and Keswick Dams, neither of them scheduled to deliver power until 1944, were granted AA-4 ratings. The Keswick rating will permit bringing the dam up to the full original scheduled height and the installation of two 25,000-kw units.

Similarly, among the U. S. Engineer projects, this week's order stops Bluestone, Markham Ferry, Wolf Creek, Center Hill, Allatoona, and Fort Gibson. Installation of second generators at Fort Peck, Denison, and Norfork are also denied high priority. The High Point and Pensacola projects of the Federal Works Agency are eliminated.

TVA lost its Wilson steam plant and Wautaga and South Holston projects, and priorities were also denied on part of the scheduled generator installations at nearly every dam in the system.

Major private projects dropped include: No. 2 generator at Boston Edison's Mystic plant; the Hell Gate installation of Consolidated Edison Co. of New York; the Peoria plant of Illinois-Iowa Power Co.; Kansas City Power & Light's Grand Avenue Plant; two installations of the City of Los Angeles; two of the Pacific Gas & Electric Co.; and an additional generator at Potomac Electric Power Co.'s Buzzard Point Plant.

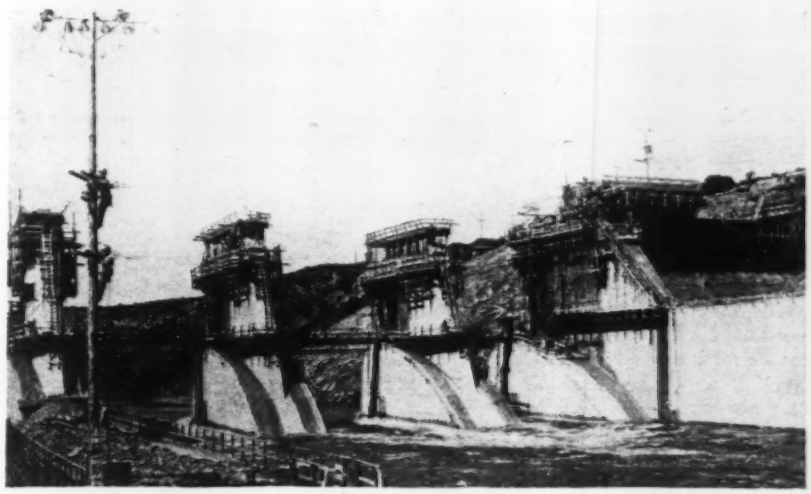
The private projects affected by the rescheduling will come to a halt at once. The public hydro-electric projects, because much of the work uses no critical material, will be allowed to continue as long as they can without priority assistance.

Eastern Canada may go on power rations

Federal regulations curtailing the use of electric power in eastern Canada is likely to be put into effect about the middle of September, Dr. T. H. Hogg, chairman of the Ontario Hydro-electric Commission, told a group of manufacturers recently.

Paper mills and other industries on the Niagara peninsula who may be seriously affected in their use of power, had sent representatives to protest the curtailment to Dr. Hogg. The Hydro-electric Commission chairman advised the delegation that his commission now has no jurisdiction over the supply of power to industry, this being solely a matter of emergency federal war control. He suggested that future power supply may be based on maximum war needs.

Meanwhile, J. Albert Smith, a member of the commission, told Ontario Municipal Electric Association members that the new federal regulations will apply to all outside display lighting, window lighting, and electric heaters in buildings.



Keswick Dam begins to take shape in California

Diverted to the east side of the canyon, the Sacramento River at Keswick Dam is flowing through open blocks in the partially completed spillway section, while excavation and concrete placement are underway in the adjacent powerhouse and fish-trap sections.

Under a contract extension, the United States Bureau of Reclamation has authorized the Atkinson-Kier Company to continue construction of the dam to its ultimate height of about 130 ft.

The accelerated construction program, dictated by the need for power for war production, will make it possible to build the second stage of the dam co-incidental with the remainder of the first.

New York, London lay post-war plans

The New York City Board of Estimate last week authorized the issuance of $10,331,555 in serial bonds and tax notes as a planning fund to launch studies and surveys of half of a $628,000,000 post-war construction program (*ENR*, Aug. 20, p. 263 and previous).

The board acted upon a report made by an informal committee which included Kenneth Dayton, city budget director; Comptroller Joseph D. McGoldrick and John C. Riedel, chief engineer for the board. This committee reported that plans must be prepared as soon as possible if the city is to be ready for an emergency program of public works as soon as the war ends. The city's ability to finance the program will be determined in the light of conditions existing when the program is initiated, the report said, adding that the need for a post war program would depend on the extent of the dislocation of employment expected on cessation of hostilities.

Final plans and specifications for the program are expected to be complete within 18 to 24 months. The resolution provided that engineers and technicians outside city service might be employed on the program in addition to the regular city staff.

London plans rebuilding

A master plan for rebuilding the city of London has been prepared by the Modern Architectural Research Group and is believed to be the first detailed proposal for the planned decentralization of a great metropolitan city to be advanced to meet a practical situation in which such a new pattern could be applied.

Instead of rebuilding on old foundations again, the new master plan proposes to substitute for the network of small streets and the city's inner suburban arrangement, a series of parallel self-contained urban units, extending north and south from the Thames. Business sections and industries would be grouped in a pleasant and convenient relationship to the residential districts of the city. The plan calls for each residential-business section to be about half a mile wide and 15 miles long.

Spaces between each of these units would be a half mile wide, traversed by traffic arteries and parks.

Reports indicate that the basic purpose of the plan is to decrease the population density of the area within a 15-mile radius of the center of London. In this area, 900,000 houses were built in the twenty years preceding the war. The plan would give decentralization, but not destructive decentralization, Mr. Nelson said.

Another feature of the proposal is the clearing of ruined buildings in the center of the city as a site for a central airport—a terminal for airlines to nearby European capitals and feeders to large outlying air terminals. Engineers have reported that a sufficient area is available near the center of the city, if a safe approach for aircraft can be assured by proper building restrictions in the area immediately surrounding the proposed site.

Ross Dam bid $2,000,000 over estimated cost

The Board of Public Works of Seattle, Wash., has announced the opening of bids for construction of the second step of Ross Dam, a part of the Skagit hydro-electric project. The only bid submitted was that by a combination of the following construction firms: General Construction Co., Seattle; J. F. Shea Co., Inc., Portland, Ore., and Morrison-Knudsen Co., Inc., Boise, Idaho. The bid was $6,146,214 for the general construction contract, which was $2,000,000 over the anticipated cost of the work. Bids previously had been called for in June but the call was cancelled (*ENR*, July 9, p. 62).

Seattle's lighting superintendent, E. R. Hoffman, said, "unless a federal grant can be secured the raising of Ross Dam will have to be withheld until after the duration of the war." "At the time our estimate was made, a few months ago, $8,300,000 would have been ample to complete the project, but since then the cost has jumped to a total of $10,530,000, which is far beyond our means," said Mr. Hoffman in making a recommendation to the city council for cancellation of the call for bids on a $7,900,000 bond issue to finance the project.

• • •

Construction of Enid Dam delayed for lack of bids

Construction of Enid Dam on the Yacona River, the third in a series of four retarding dams to control floods in the Yazoo River Basin in Mississippi, has been postponed because no bids were submitted. Col. S. D. Sturgis, Jr., of the U. S. Engineers, reports that 600 companies had been invited to estimate on the project. Money for this work was appropriated last April and the U. S. Engineers had been ordered to offer invitations for bids. In view of the large number of invitations sent out, said Colonel Sturgis, it is quite evident that lack of equipment has prevented these concerns from submitting bids. No further invitations will be issued until at least next spring.

Plans for Enid Dam call for an earth-fill 8,400 ft. in length with an average height of 78 ft.; estimated cost was $8,000,000.

Sardis reservoir, situated on the Little Tallahatchie River, was completed in 1940 and Arkabutla on the Coldwater River will be finished in December; construction of New Grenada on the Yalobusha River is scheduled to be constructed last.

The series of dams along with an extensive drainage program was authorized by an act of Congress in 1936.

Seattle engineers favor second Alaska route

The proposed coastal, or "A" route for an Alaskan highway has been supported in a resolution of the Engineers Club of Seattle, over the proposed construction of a railroad (*ENR*, July 2, p. 6) to supplement the route now under construction.

The "A" route (*ENR*, April 2, p. 515) would give Seattle highway connections with Alaska by way of Prince George, B. C., Whitehorse, Y. T., and Fairbanks, Alaska.

The resolution passed by the club said that the advantages of the "A" route would include the fact that construction may be started simultaneously at several points now accessible by water, highway or rail; that weather conditions are favorable; that the "take-off point" at Prince George is on a transcontinental rail line, and that the route would be a straight line without excessive grades or high mountain passes.

Los Angeles seeks public health engineers

The Board of Civil Service Commissioners of the city of Los Angeles, Calif., has announced a nationwide open competitive examination for public health engineers, to be held September 25 at Los Angeles and such other places as the number of applicants warrants.

Applications must be filed by 5 p. m. on September 4.

Candidates must have education equivalent to graduation from a school of sanitary or civil engineering, at least three years of experience in a large public health department and be registered civil engineers in California or be eligible for such registration. Salary will be between $350 and $400 per month.

In an announcement of the examination, the commissioners said they have waived the local residence requirements and have opened the examinations to nationwide competition.

Flood control work on Rio Grande held up

Preliminary construction work on the $65,000,000 gravity canal and flood control system along the lower section of the Rio Grande has been held up because of the difficulties of securing labor. Government authorization has been given and an appropriation made for surveys and other preliminary operations, but the labor situation has caused the project's chief construction engineer, Charles Seger, to delay the beginning of operations.

The intake of the canal will be on the Rio Grande near Zapata, and the waterway will run southeast a distance of 168 miles along the river front. It will intersect 38 privately owned irrigation canal systems and will serve as a master water feeder for these private systems.

A 29-mile section of the canal will supply stored waters from the Los Olmos Creek Reservoir, near Rio Grande City, to the Mission Reservoir in southwestern Hidalgo County, the central portion of the project.

The western section of the canal, 71.9 miles from a point west of Zapata to the Los Olmos Creek Reservoir, will be known as the "Rincon Gravity Diversion" and will take water directly from the Rio Grande and store it in the Los Olmos Creek basin. A dam will be built just east of Rio Grande City across Los Olmos to form a reservoir with a capacity of 315,000 acre-ft. of water. A hydroelectric plant is planned eventually for the Los Olmos Reservoir.

90,000 acre-ft. storage

About 90,000 acre-ft. of water will be stored in the Mission Reservoir, which will be fed constantly to maintain its normal level through the 29-mi. section of the canal. The main irrigation section will be 67.7 mi. in length, stretching from the Mission Reservoir to Brownsville, and providing all Rio Grande Valley cities and irrigation districts with water necessaary for irrigating about 400,000 acres of land. This latter section will be the actual operating division of the project, since the water brought to it will be put to use in that area.

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Thirty percent decline reported in traffic

The American Automobile Association has released a report showing that general highway traffic had dropped more than 30 percent throughout the country with June recreational travel showing a 55 percent decline below the June, 1941, mark, while the eastern gasoline rationing area reported a drop of more than 70 percent.

Pennsylvania sets flood damage losses

Flash flood damage to Pennsylvania highways and bridges since the beginning of 1942 has amounted to $2,341,591, according to a report by the State Department of Highways.

Rainfall preceding the flash floods has been as much as 7 in. in nine hours—at Carbondale on May 22. Other record rainfalls included 4 inches in one hour at Phoenixville on June 12 and 17 in. in 17½ hours at Coudersport on June 17.

The department report says that the damage from floods this year will approach that of 1936, when the most devastating flood in the history of the state swept the Delaware, Susquehanna and Ohio drainage basins on St. Patrick's Day.

The figure for the current year includes the actual cost of floods up to and including the July 17-18 flood and estimated cost of floods occurring since that time.

Already, $767,462 has been authorized for repairing damage to roads and $145,770 has been authorized for repairs to bridges or placing temporary structures. There are still many instances where temporary repairs to roads have been made and the estimated cost of replacing the roads to their former condition is $521,442.

In addition to this, there were 39 bridges damaged or destroyed in the May 23 flood; 13 in the July 18 flood; 20 in August 8 flood, and others in more recent deluges. In all, it is estimated that $906,917 will be the cost of repairing or replacing the bridges damaged.

The highway department report noted that highway engineers, busy redesigning the structures damaged, have been faced by the problem of specifying substitute materials, salvaging of structures not completely destroyed and using other expedients.

"Every available source is being searched to obtain materials required for replacement of these bridges and the design of many of the structures is determined largely by the materials available," the report said. "In addition to the difficulties being encountered in obtaining material for the repairs and replacement of bridges, the department of highways is handicapped further by reason of the lack of skilled labor and the necessary equipment required for the restoration of bridges and roads damaged by flood."

Wage adjustment body gives few raises

The Department of Labor's Wage Adjustment Board is taking a fairly stiff stand on requests for construction wage increases. In the first six weeks of operation, the board reported last week, it had approved only five requests for increases, and turned down eighteen.

The Wage Adjustment Board, of which Assistant Secretary of Labor Tracy is chairman, was set up to administer the agreement (*ENR*, May 28, p. 879; July 16, p. 75) between the Labor Department and the Building Trades Department of the AFL put into effect last May. The agreement, in effect, provided that wage rates on federal construction would be those in effect July 1, 1942, except as changes might be approved by the adjustment board.

The five increases approved by the board to date were as follows: 12½c. for carpenters in Pine Bluff and Stuttgart, Ark.; 12½c. for operating engineers in Norfolk, Va.; 6¼c. for asbestos workers there; 10c. for Charlotte, N. C. painters; 12½c. for Dayton, Ohio, painters.

NLRB weighs intervention

The National Labor Relations Board will decide within the next few weeks whether to take a hand in the jurisdictional issue over various construction and related workers that arose when John L. Lewis absorbed the former Construction Workers Organizing Committee into District 50 of his UMW union.

The CIO has never recognized the absorption, has declared the CWOC dissolved, and has sought to organize the former membership into local industrial unions. Thus, in many cases where the old CWOC had a labor contract with an employer, the question arises as to whether the local industrial union or district 50 inherits the contract.

In about a dozen such cases, the local unions have asked the NLRB to decide the issue. The board will announce soon its decision whether to call an election at the Harbison-Walker Refractories Co. of Chester, Pa. This will be a test case.

Canada cuts shingle shipments to U. S.

The Canadian Timber controller has issued orders to British Columbia's $10,000,000 shingle industry arbitrarily reducing to 50 percent the volume of shipments to the United States. The industry has sold at least 75 percent of its entire output to the United States in recent years.

BRIEF NEWS

In view of a serious housing shortage in urban areas in eastern Canada, the Canadian government will make another three million dollars available for housing purposes, according to Finance Minister Ilsley. One million dollars will be made available for loans for construction of small homes under existing arrangements, through the National Housing Act; two million dollars are to be for loans for the conversion of large houses into apartments.

The Missouri State Board of Registration for Architects and Engineers has served notice that it will start action in October against any and all engineers or architects operating in the state who have failed to secure Missouri licenses. The only exceptions will be those specifically exempted under the provisions of the licensing law.

Construction of a $350,000, 1,100 ft. overpass over the Louisville & Nashville Railroad tracks at Egan Ave. in Louisville, Ky., has been suggested as a means of eliminating a dangerous crossing and traffic bottleneck.

The North Carolina Highway and Public Works Commission recently adopted a wartime policy confining highway activities strictly to essential maintenance work. The action was taken affer the commission was advised by Gov. J. M. Broughton that gasoline and tire rationing would bring at least a 50 percent reduction in highway revenues, and that the highway surplus must be spent sparingly.

July reports of traffic at the Straits of Mackinac, in Michigan, showed a 43 percent decline as compared with July of 1941, according to G. Donald Kennedy, Michigan state highway director.

Pennsylvania's department of highways has sponsored 129 projects under the Pennsylvania State Work Relief program since July, 1941. Highway projects included the construction or reconstruction of 147.92 miles of road and 19 bridges at an estimated cost of nearly $3,000,000.

The Michigan highway department's administrative pool of automobiles is saving a net weekly average of 98 miles for each car, according to figures released recently.

Building construction, particularly urban, throughout Mexico, which has been booming for some time, seems to be headed for a sharp slump, as the Ministry of Finance has ordered all banks to restrict loans for this purpose to works that are already under way or are definite necessities. The action was taken, the Ministry explained, to assure that the banks concentrate upon financing industry and agriculture to strengthen Mexico's contribution to the war effort.

The National Research Council of Canada has issued in combined book form the three parts so far completed of the Canadian National Building Code—the preparation of which was started before the outbreak of the war. The three parts are those dealing with engineering and construction requirements, fire protection and health measures and sanitation.

Texas construction contracts soared to the highest figure in the state's history in July, with awards totaling $171,906,776. Awards for the month were nearly 50 percent of the amount put under contract during the first six months of 1942.

An $87,195 extension to Orlando, Fla.'s present sanitary sewer system has been approved by the Federal Works Agency and work is expected to start shortly. Financing will include an outright grant of $69,756, and a $17,439 contribution from the city.

Mississippi takes over Pascagoula River Bridge

Mississippi State Highway Director Douglas McKenna has assumed supervision and maintenance of the toll bridge near Pascagoula, Miss., across the Pascagoula River, preparatory to the state's removal of the toll charge as of Sept. 1.

The state legislature last winter passed a bill (*ENR*, March 5, p. 361) to prohibit collection of tolls on any bridge in the state highway system and to enable the state to take over the Pascagoula bridge. The structure is a link in U. S. Highway 90.

According to figures presented to the legislature, the bridge has returned $1,625,000 in tolls collected as compared to its cost of $140,000.

Alabama frees toll ferry

The Alabama state highway department recently took over the last privately owned toll ferry on the state highway system, making use of the vessel free.

The ferry operates across the Coosa river on State Highway Route 22, below Mitchell Dam, between Verbena in Chilton County and Rockford in Coosa County. The state will operate the ferry line hereafter, in cooperation with the two counties.

Sewer construction order lifted at Elizabeth, N. J.

An order of the Interstate Sanitation Commission directing the city of Elizabeth, N. J. to construct a $2,000,000 sanitary sewer to aid in clearing tidal waters in Newark and lower New York Bays of sewage pollution, will be suspended for the duration of the war, according to Mayor James T. Kirk.

Chief reason for delaying the project is that priorities would make it virtually impossible for the city to purchase steel pipe and other materials for construction of a pumping station. The suspension does not mean that the order will not be enforced when materials are available.

The Sanitation Commission's order, made about a year ago, was divided into two parts, the first directing an immediate connection to enable about half of the city's untreated sewage to be diverted through the treatment plant of the Joint Sewer Meeting at Elizabeth, N. J. This connection was made last December, and the city now is treating daily about 7,000,000 gal. of sewage which formerly was discharged into the Arthur Kill. The second half of the commission's order, which gave the city two years in which to complete the downtown sewer and pumping station, is the one affected by the suspension ruling.

Ohio proceeds with work on railroad underpass

Contractors have started work on construction of an underpass under tracks of the Pennsylvania and Baltimore & Ohio Railroads just east of the city of Columbus, Ohio. The $300,000 project is on State Route 317, generally known as Poth Road, one of the highways leading to the municipal airport.

General contract, awarded to Robert J. Dienst, of Columbus, for a bid of $318,310, calls for completion of the project by June 30, 1943.

Before starting work on the project, it was necessary to move the tracks of both railroads some distance to the south in order to drive piling for the first structure without interference with the very heavy train traffic. The underpass will be a concrete encased steel beam structure, with concrete piers and abutments, having two spans, each 36 ft., to provide two traffic lanes each 24 ft. in width and separated by a median strip. Specifications call for 74,297 cu. yd. of excavation, 422,000 lb. of structural steel, and 32,273 lb. of reinforcing steel.

In addition to the grade crossing elimination work, the general contract calls for the paving of the approaches to the underpass and construction of an access road leading to local industries. The work is a federal aid project.

WASHINGTON HIGHLIGHTS

EXPENDITURES authorized for war construction since the start of the defense program in mid-1940 now total more than 34.5 billion dollars. Of this, $17,601,000,000 is for industrial facilities, $15,534,000,000 for military and naval installations, $1,392,000,000 for housing.

A BUILDERS' Hardware Manual setting forth permitted quantities and types of hardware to be used in various types of building construction has been issued by WPB. Housing projects and building projects on which priorities have been granted since Aug. 3 may only use their ratings to the extent permitted by the manual. Projects contracted for after Aug. 15 by the RFC, PBA, or NHA must follow the manual, as must projects contracted for after Oct. 15 by the Army, Navy, or Maritime Commission.

OPA's Maximum Price Regulation 206 establishes manufacturers' ceiling prices, at about the level of Oct. 1-15, on vitrified clay sewer pipe in the Eastern, Southern, and East Central regions. Separate price schedules are established for each region.

PETROLEUM Coordinator Ickes has approved an extension of the Plantation Pipeline from its present northern terminus at Greensboro, N. C. to Richmond, Va. The extension is to be made with used pipe which, it is believed, can be located. Arrangements are now being worked out for Defense Plant Corp. financing.

The new project fits into a general scheme to step up the activity of the Plantation line. The proposed line will have a capacity of 30,000 bbl. per day. This oil will be obtained at Greensboro by improvements, on which bids are now being received, in the Plantation pumping system which will have the effect of stepping up the capacity of the main line from 60,000 to 90,000 bbl. per day. At the southern terminus, Beaumont, Texas, the additional oil will be obtained by a 30,000-B/D extension to Baton Rouge. Contract for the extension has already been let, and construction is due to start soon.

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Rigid control set on softwood lumber

Rigid controls on the distribution and use of all types and grades of softwood lumber, effective Aug. 27, have been established by the War Production Board. These regulations are embodied in Conservation Order M-208, which replaces the temporary construction lumber "freeze" order L-121. (*ENR*, May 21, p. 836).

The principal feature of the new order is the division of all purchase orders for softwood lumber into four classes, based on the relative essentiality of the use to the war and civilian economies. These classes are:

(1) Orders for the most urgent needs, bearing preference ratings of AAA, AA-1 or AA-2; (2) orders bearing preference ratings of AA-2X or lower, but higher than A-1-a; (3) orders bearing preference ratings A-1-k through A-1-a; (4) orders bearing preference ratings lower than A-1-k.

When an order bearing a preference rating is received by a producer or distributor, it will fall into one of these four classes. Thereafter, the rating on the particular purchase order will be treated as though it were the highest rating in the class in which it falls. For instance, all orders in Class 2 will be treated as if they bore AA-2X ratings. This provision in effect limits preference ratings on softwood lumber orders to four only.

The order also provides that no person may accept delivery of softwood lumber unless the lumber is required for use within 60 days, or in the case of green lumber needing seasoning, 120 days.

Chesapeake-Delaware Canal partially clear

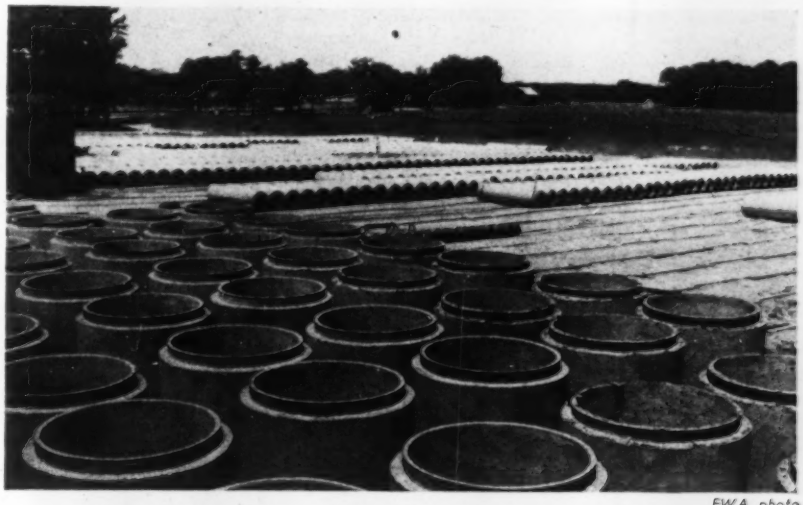
Wreckage of a draw-bridge over the Chesapeake and Delaware Canal, the bridge having collapsed due to impact of a tanker on July 28, (*ENR*, Aug. 6, p. 11) has now been partially cleared by the U. S. Engineers. The clearance is 100 ft. wide to a depth of 23 ft. Vessels are moving through the canal, but are subject to delays because of continuing work being carried on to free the canal of the tangled mass of steel.

• • •

Mexico orders air raid shelters in new buildings

Although the likelihood of air raids on the Mexican capital are officially called "remote," the government of Mexico city will require air raid shelters in all office and apartment buildings planned or now under construction.

Shelters must be built of reinforced concrete or other materials whose ability to withstand bomb explositions has been proved, and must be capable of comfortably accommodating all occupants of the building served. Plans for providing shelters in existing structures are already under consideration.



FWA photo

Pipe rolls out for Newport News water supply

Telescoping the work of years into a few months, engineers and contractors on the new water supply for Newport News, Va., are rushing completion of a 32-mile reinforced concrete pipeline to tap the Chickahominy River. Pipe laying started on June 2 and it is expected that water will flow through the line on October 1.

To manufacture the pipe, the Lock Joint Pipe Co. of Ampere, N. J., set up a fabricating plant near Ewell, Va., where a daily schedule of casting 100 sections is maintained. Half of the output is 34 in. diameter pipe, and the balance is 39 in. in size; all sections are 16 ft. in length. It is believed that this is the largest concrete pipe manufacturing yard ever placed in operation.

Newson and Aldrich of New York are engineer-consultants on the project and Howard C. Jones is job manager for the Lock Joint Pipe Co. The Federal Works Agency is represented by Kenneth Markwell, regional director. This project will be described in detail in an early issue of Engineering News-Record.

Speeding the war effort:

Bending every possible effort toward strengthening America's war participation, engineers and constructors throughout the nation are advancing new production ideas, new methods of doing their jobs, finding new sources and uses for critical materials. Some of the results last week were:

Biggest construction news continues to be the amazing performance of American engineers in building ships to carry supplies to the nation's farflung fighting fronts. Admiral Emory S. Land, chairman of the U. S. Maritime Commission, announced that 71 new cargo ships and tankers were delivered into service during July.

The 71 vessels, of 790,300 deadweight tons, are a new world's record for steel ship construction, and surpass the mark made in June when American shipyards turned out 67 new ships of 748,154 deadweight tons. For the first time in several months, East Coast yards led the nation, with a total of 30 deliveries as compared to a total of 27 by the West Coast. Yards along the Gulf Coast delivered 13.

Performance records established by American shipyards engaged solely in construction of Liberty ships since the inception of the program in December, 1940, also were announced. Heading the list with the most records made is the Oregon Shipbuilding Corp., which has built 54 ships. Second is the Richmond Shipyards Nos. 1 and 2 with 47 ships, and third, the Bethlehem Fairfield Shipyard, Inc., with 46. Bethlehem Fairfield also holds the records for the shortest time elapsed from the date of the original contract for facilities until the laying of the first steel. Shortest time for erection of one ship was 46 days, by Oregon Shipbuilding.

Aiding the program, the Baltimore & Ohio Railroad Co. announced that its Baltimore, Md., shops were producing parts for engines of the Liberty ships.

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Taking advantage of curtailment in highway construction and maintenance work, the Connecticut state highway department has transferred its own personnel to a guard force to keep watch over all bridges on the Merritt Parkway, the Boston Post Road, and Route No. 6 between Danbury and Danielson, as well as bridges over the Connecticut, Housatonic and Thames Rivers. Rodman, chainmen, inspectors, transitmen and junior engineers, a total of 225 persons, have been chosen for this guard work. The top salary is $2400. The plan allows workers to retain their seniority in the department under classified service.

★ ★ ★

To aid in the conservation of critical materials, the Virginia State Division of Motor Vehicles has announced it will issue fibre license plates to replace certain metal ones now in use. Crawley F. Joyner, Jr., director of the division, has announced that the first fibre plate manufactured by convict labor at the Virginia state penitentiary will be placed on "for hire" vehicles and motorcycles. Such plates may later be used on private automobiles.

At Baltimore, Md., the city department of public works listed among substitutes now being used wooden pipe, terra cotta pipe and pipe made of reinforced concrete tieing of highway slabs with special concrete lock joints, and the use of joints made of waste and scrap cork.

★ ★ ★

Street car rail reclamation programs were announced by Birmingham, Ala., Louisville, Ky., and Shreveport, La. Other salvage moves included the Kentucky state highway department's assignment of an old steel bridge over the Green river near Frankfort, Ky., to the war effort; the diversion of steel flash railing for an approach to Pittsburgh's Liberty Bridge to war use; the ripping out of defective steel highway curbing in Pittsburgh, and the tearing up of 138 tons of steel rail which had formed part of the Crum Creek branch of the Baltimore & Ohio Railroad at Eddystone, Pa. At Humboldt, Ariz., Charles Dunning, veteran Arizona mining engineer, began working over a 60,000 ton "tailings" dump, accumulated in 30 years to recover an estimated 1 percent ore.

The American Way

The Office of Defense Transportation recently asked curtailment of organizational conventions. The Moles, New York organization of heavy construction men, reacted in pure Americanese, opening a formal note to members concerning an annual outing with the statement, "No Dice."

Said The Moles:

"The Japanese are holding the Philippines, the Germans are holding the Ukraine, the World is holding its breath, and the restaurant is holding the bag. Rommel has all the sand (temporarily); Hitler has all the ice (temporarily); Hirohito has all the rubber (temporarily); our tire bootleggers are all in jail; all gassing must be purely verbal; the clamdiggers have joined the Navy; the Coast Guard has requisitioned the boats."

Building labor down 60 percent in England

Less than 60 percent of the number of building workers employed before the war are still engaged in construction work in the British Isles. Since December some 42,000 men have been called into the armed services, these include all building workers under 25 years of age and most of those under 30, and the age limit of reservations is being raised to 41.

Meanwhile 28,000 building workers who were due to be called to arms since the middle of the year has been postponed, and proposed drastic measures for concentrations of the British building industry have also been held up temporarily. Though all private building work has been stopped long ago and the government war construction program approaches completion, special arrangements are being made to maintain the building industry in a state of preparedness for quick action to meet future calls.

The government has ordered a centralized survey of the allocation of contracts to insure that some contractors shall not be overloaded and that work is spread as equitably as possible. To ease the call-up of building workers below the raised reservation age, men will not be required to leave at present if engaged on or transferred to work scheduled as important to the war effort.

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Road personnel reduced 40 percent in S.C.

The South Carolina State Highway Department has reduced its personnel by 40 percent to keep wartime costs below declining revenues, according to J. S. Williamson, chief highway commissioner. The department in all its divisions employed 5,305 persons at the end of July, 1941, and this figure was reduced to 2,547 by July 31 of this year.

Mr. Williamson explained that these figures represented "direct employment" —persons employed by the department and not including those employed by contractors doing highway construction work. This action has been necessary due to declining revenues as a result of gasoline, vehicle and tire rationing. Income from these sources showed a 21 percent drop in June, and for July a decline of 17 percent from the corresponding months of 1941.

Although the department still carries on a large amount of maintenance work on the state's 12,000 miles of highways, the only new construction being done is that which was begun before priorities were imposed, and such projects required for military use.

OBITUARY

Fergus Ford Kelly, formerly a civil engineer employed by the City of New York, has been killed in action in a naval plane accident. Mr. Kelly, who held the rank of ensign, lived at 89-01 187th Place, Hollis, Queens.

Charles R. Main, 57, formerly an officer of the consulting engineering firm of Charles T. Main, Inc., of Boston, Mass., died at Winchester, Mass., Aug. 22.

Herbert J. Cripps, Sussex, N. B., alderman, and highway structural superintendent with the Provincial Department of Public Works, died at St. John Aug. 12.

John Ostler, 82, retired engineer who worked on many construction jobs including the Panama Canal, died at Cornwall, Ont., Aug. 14.

Edward J. O'Meara, 53, engineer for the Wisconsin Highway Commission, died Aug. 18 at Madison. He had been employed by the highway department for 22 years.

James Church, 73, superintendent of the Green Bay, Wis., water department until his retirement in 1939, died recently at Green Bay.

E. Snell Evans, 29, civil engineer for the Long Construction Co. at Elloree, S. C., died recently at Charleston.

George B. Hart, 48, an employee of the U. S. Engineer Office at Louisville, Ky., died at Chicago recently.

John M. Crawford, 66, civil engineer of Akron, Ohio, died Aug. 14.

Robert E. Shanahan, 55, superintendent of construction for the R. H. Evans Co. of Columbus, Ohio, died recently at Canton.

Ing. Mariano Moctezuma, 69, Mexican engineer and a director of the National School of Engineering, died recently in Mexico City.

John Knight, superintendent of buildings and maintenance for the Cranbrook Foundation at Bloomfield Hills, Mich., died recently at Detroit. A specialist in the construction of newspaper plants, Mr. Knight was formerly construction engineer for Booth Newspapers, Inc., of Michigan, and had been associated with Albert Kahn, Inc., of Detroit. He was 44.

E. L. Brandon, who was grading contractor on two large projects in southern Nevada, died recently at Los Angeles, Calif.

Edward D. Cross, 67, Buechel, Ky. steel contractor, died Aug. 14 at Louisville, Ky.

Milton Rogers, 53, Louisville, Ky. contractor, died at Highland Park, Ky., recently.

Jesse O. Hayley, 79, Birmingham, Ala. building contractor, died recently at Birmingham.

Alvin H. Cortright, 74, Miami, Fla. building contractor, died Aug. 16 there.

Frank H. Frainie, 67, Baltimore, Md. building contractor, died recently at Baltimore.

Frank Harold Grimm, 41, Fayetteville, N. C. contractor, died at Fayetteville recently.

Charles H. Terry, 71, retired civil engineer, died at St. Anthony's Hospital, Columbus, O., August 21.

Alvin C. Harvey, 58, chief engineer for the Nickel Plate Railroad, died at his home in Cleveland, O., August 22. He was born in Mansfield, N. Y., and was a graduate of Purdue University.

James E. Lewis, 59, retired architect of Canton, Ohio, died there August 21. Until his retirement several years ago, he was vice-president of the J. E. Lewis Co.

CONTRACTS AND CAPITAL

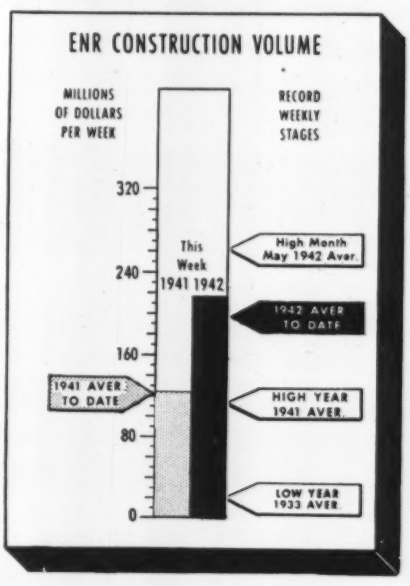
ENGINEERING CONSTRUCTION volume for the week, $217,798,000, tops the total for the corresponding 1941 week by 75 percent, but is 6 percent lower than the volume reported for the preceding week. Public construction almost doubles the total for a year ago, but is 6 percent below a week ago. Federal work is up 152 percent over last year. It is, however, 7 percent below last week. Private construction is 59 percent lower than a year ago, but climbs 15 percent over a week ago.

The current week's construction brings 1942 volume to $6,919,897,000, an increase of 60 percent over the total for the 35 weeks of 1941. Private work for the period, $436,517,000, declines 51 percent. Public construction, however, is up 89 percent compared with a year ago due to the 138 percent gain in federal work.

In the classified construction groups, gains over the week last year are in waterworks, sewerage, public buildings, earthwork and drainage, streets and roads, and unclassified construction. Increases over last week are in earthwork and drainage, bridges, and streets and roads.

New capital for construction purposes totals $970,000 for the week, and is made up entirely of state and municipal bond sales. This volume compares with $31,156,000 reported for the 1941 week.

New construction capital for the year to date, $9,518,744,000, is 76 percent higher than the $5,403,461,000 recorded in the 35 weeks of last year.



CONTRACTS

(Thousands of dollars)

	Week Ending Aug. 28 1941	Aug. 20 1942	Aug. 27 1942
Federal	$80,428	$217,040	$202,003
State & Municipal	25,836	7,184	8,371
Total public	$106,264	$224,224	$210,374
Total private	17,969	6,482	7,424
TOTALS	$124,233	$230,706	$217,798
Cumulative 1942 (35 weeks)			$6,919,897
1941 (35 weeks)			$4,329,627

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 35 weeks	1942 35 weeks
NON-FEDERAL	$1,005,872	$551,846
Corp. Securities	300,724	164,324
State & Mun.	326,738	176,403
U.S.H.A. loans	30,399	.....
R.E.A. loans	100,500	.....
R.F.C. loans	84,511	128,419
Fed.-Aid—Highways	163,000	82,700
FEDERAL	$4,397,589	$8,966,898
TOTAL CAPITAL	$5,403,461	$9,518,744

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	Aug. '42	281.61	135.37
Building Cost	Aug. '42	225.39	121.84
Volume	July '42	736	323

FHA MORTGAGES

	Week Ending Aug. 23 1941	Aug 15 1942	Aug. 22 1942
Selected for appraisal			
Title II	$28,862	$6,152	$6,535*
Title VI	$3,930	$14,368	$13,649*

*Subject to revision.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Against Design Refinements

Sir: It may be of interest to make theoretical fine-spun computations of strains in structures and strength of materials used, but the possibilities of human errors in construction, even under inspection, and occasional hidden defects in materials, lead us to consider if we should not (1) assemble all facts that could possibly affect the proposed structure; (2) design conservatively; (3) use normal factors of safety; and (4) add substantially, to cover unknown forces or hidden defects.

Past loss of bridges due to unusual storm conditions, of dams and buildings due to factors unknown or to overloading in use seem to teach that safety of human life and property, and protection of reputation and peace of mind of designers and builders require that risks in design should be lessened, rather than increased. Figure to make structures safe, and then some. Let the owners pay a little more. It will be good for them in the end.

G. H. WELLS
Los Angeles, Calif.

A Diller, A Dollar!

Sir: Nazi money for those who fail to report for work is a scheme developed by a mid-western firm to shame those taking a "day off." The plan is simple and has proven effective. Those who miss part of their regular working hours find spurious German currency for the time lost in the regular pay envelope with good American greenbacks for the time worked.

An explanatory note on the German money states that since those not reporting for work are helping Hitler by slowing production they should be paid by the Nazis.

Work at the shipyards, construction jobs and manufacturing plants throughout the country is being seriously hampered by those who take a day off; because it's hot, because they are a little tired, because they are a long way from the firing-line and do not appreciate the seriousness of the situation. Too few of us have so far come to realize the truth of the adage "It all depends on me" that helped Britain through the dark days after Dunkirk.

It will help production throughout the country if those who have devised a scheme for keeping up morale make it available to others, perhaps through the medium of the technical press.

B. D. SHERMAN
Elmhurst, L. I.

Taper Cuts on Wood Piles

Sir:—We have tried to decrease driving resistance by making equal saw cuts on opposite sides of the lower end of timber piles, taking care to make both cuts just the same so that there would be no tendency for the piles to be deflected one way or the other as they were driven. This plan was not a success; any advantage in decreased driving resistance was more than offset by the tendency of the pile to deflect. In other words, all of the piles with the tapered bottoms tended to deflect and when we changed back to square butt cuts this tendency disappeared.

We realize that concrete piles are cast with tapered lower ends. May it be that the reason for no tendency to deflect in the concrete piles is their greater weight and true alignment? Many timber piles have some slight curvature and it may be that this contributes to the tendency to deflect.

It would be interesting to know the experience of others on this point.

K. T. ROBERTS
San Francisco, Calif.

Using Tubing to Save Steel

Sir:—On the basis of saving steel, the article "Tubing Saves Steel in Long Trusses" in *ENR*, July 2, 1942, p. 37, is excellent in that it indicates what can be done and how it may be done when tubes are used. However, it would be well to keep separate the facts concerning a tube truss and the usual welded truss such as, for example—that the truss is free of eccentric stresses and provides fixation at the ends of the web members. This is true of all welded jobs properly designed.

Welded trusses are inherently low weight or "steel saving" jobs. Gusset plates or connecting pieces will be largely eliminated in a well-designed welded truss regardless of the type or the shapes used. Reference is made to the second page of the article where it is stated that T's might be used instead of two angles and that there would be fewer parts to handle. The "simplicity of the joint design" is not evident; in fact, in Fig. 2 the weld is shown all the way into the corner, which is commercially and practically impossible. Also, the indicated scarfing is costly and takes time.

T's for chords and slotted tubes for diagonals would permit easy quick assembly, or it might be advisable to flatten the ends of the tubes, which would result in concentricity. This arrangement is desirable and easily obtained by welding.

Cost comparisons, even estimated, are not given, it being stated that "it is impossible to make a definite cost comparison with conventional methods of design." The construction should be a matter of the total cost, which, under normal conditions, is the important and final factor. Saving in steel is a valuable item but unless it is accompanied by a saving in time of production as well, it does not result in the most economical answer.

The article presents an excellent idea and method of approach to the truss problem, but it would have helped greatly if full advantage and use had been taken of the inherent time, weight and cost reduction properties of welding.

E. W. P. SMITH
Consulting Engineer, The Lincoln Electric Company, Cleveland, OhOio

For Inventors' Attention

Sir: After reading the editorial "Something is Missing" (*ENR* July 30, 1942, p. 148) I am prompted to send this note and to call attention to Information Bulletin No. 2 "How Inventors Can Aid the War Effort" prepared by the National Inventors Council of the U. S. Department of Commerce and available from the U. S. Government Printing Office. Among other things it describes the operation of this council.

To date, our technical staff has ex-

amined about 90,000 inventions or suggestions, most of them from "the lone civilian with an idea." Many have been found of real importance, and some are in actual use.

We have "investigational facilities" and, in cooperation with the National Bureau of Standards and other agencies, we can "test new devices or methods," although funds for this purpose are somewhat limited.

Engineering News-Record may wish to call attention to our council, which is the place to send "interesting proposals."

L. B. LENT
Chief Engineer, National Inventors Council
U. S. Department of Commerce
Washington, D. C.

Continuous Girders Preferred

Sir: In recent issues you have devoted considerable space to propositions on how to save steel. It is timely, therefore, to comment on the article "Cantilever Girders Preferred" by Charles H. Wood, (*ENR* Aug. 13, 1942, p. 235) in which advantages of cantilevers over continuous plate girders are pointed out based on two designs for a 360-ft. three-span bridge. The superiority of the cantilever is arrived at from comparisons of certain computed moments and units stresses for the two arrangements.

The statical effect of making three simple spans continuous, with or without hinges, is that moments are introduced over the supports, where they were zero before. The sum of the moments that remain at the centers of the spans and the support moments is evidently constant and equals the sum of the three simple beam moments for the same loads. The live-load moments are derived from slightly different loadings for the two arrangements, this being the reason for the slight difference between the summations. Large differences would indicate an error in the computations, but nothing else. The areas of the moment diagrams, however, are a measure of the required sections, and for the cantilever moment area about 15 percent larger is shown than for the continuous girder.

The location of the hinges definitely determines the magnitude of the support moments; they remain independent of the deformations of the cantiliver. For the continuous girder these moments are obtained from elastic equations based on the proportionality of loads and deformations. The fundamental difference between the statically determinate cantilever and the indeterminate continuous girder is that in the former no part limits the deformation of the other, while in the latter a reciprocal limitation of the deformation of certain sections exists. This reciprocal limitation of the deformations brings into play the ductility of the steel, and permits different equilibrium conditions from those defined by the elastic equations.

This is the structural advantage of the continuous girder. The allowable unit stresses based on the yield stress define the factor of safety of the cantilever, but have no meaning for the continuous girder in which the simultaneous occurrence of the yield stress in three sections is necessary before unlimited deformations can occur under uniform load. This circumstance raises the carrying capacity of the continuous girder, on which the predominant loading is a uniform dead load, considerably above that of the cantilever having the same amount of steel. The proportionality between loading and the stress produced and the yield stress as basis for an allowable unit stress does not furnish a measure of the factor of safety of the statically indeterminate steel girder.

Attention was directed to this fact more than fifty years ago; since then, especially during the past 25 years, the question has been cleared sufficiently to receive consideration in a design where uniform dead load is the far predominant load.

Tests have shown that the ultimate carrying capacity of a continuous steel girder is not affected by small settlements of the supports. If these settlements are large, both types of girders need adjustment.

The buckling stability of the compression flange may be the limiting factor of the carrying capacity. The moment diagrams indicate the advantage of the continuous girder also in this respect.

It is not necessary to use $\frac{3}{4}$-in. web plates throughout, stiffened web design could also be considered.

The field splice in the continuous girder is simpler than the seating and expansion arrangements of the suspended span of the cantilever and the eight-lane wide expansion joint in the floor. The damage to floor concrete occurs mostly at expansion joints unless they are of substantial design and, moreover, this long joint costs more than the field splices.

The continuous girder can be used in a structure with greater safety or more economically or both than the cantilever. Steel saving can be accomplished without impairing the carrying capacity of structures by designs utilizing the ductile properties of the steel whenever possible. This, and the use of stiffened structural elements, presupposing proper layouts, is a more efficient way to save steel than an indiscriminate raising of unit stresses that result in widely different factors of safety for structures of different design.

LOUIS BALOG
Consulting Engineer
New York, N. Y.

Steel Stresses and Heat

Sir: G. M. Zucco (*ENR*, Aug. 13, 1942, p. 77) proposes to increase working stresses in structural steel by one-third which, I understand, would mean 26,667 psi. in tension or, under normal temperatures, a factor of safety of 1.35 on the elastic limit.

As every structural engineer knows, the strength of steel decreases with the application of increasing temperatures. In the standard fire test, a temperature of 800 deg. F. is obtained in less than five minutes and, at this temperature, the elastic limit of structural steel is about 10,000 psi. At a temperature of 800 deg. F. with a working stress of 16,000 psi., the elastic limit was 62½ percent of the working stress. When the working stress was increased to 20,000 psi., the elastic limit at this temperature was reduced to 50 percent of the working stress. Under Mr. Zucco's proposal, at a temperature of 800 deg. F., the elastic limit would be only 37½ percent of working stress.

In view of the above information, how far can we go in increasing steel stresses? Does the present emergency justify the setting aside of those provisions designed to protect life and property? If further increases in steel stresses are justified on the basis of its strength under normal temperatures, then should not its use without protection be further restricted or the steel given some type of fireproofing so as to make it at least as strong under a temperature of 800 deg. F. as it used to be when the working stress was 16,000 psi.?

J. G. SHOPE
Structural Engineer
Arlington, Va.

EDITORIALS

VOLUME 129 NUMBER 9

August 27, 1942

Mr. Kaiser's Great Accomplishment

TO BE RECOGNIZED by hard-boiled construction men as one of the best contractors in the heavy construction field is a feat of no mean proportions. To enter such a specialist field as shipbuilding, turn your back on accepted methods, and be praised by your competition for the results you achieve is even more noteworthy. Henry Kaiser has tasted and deserved both of these measures of success, but they are no more astounding than his latest accomplishment of becoming the darling of the press. The only part of the newspaper that Mr. Kaiser has failed to make so far is the woman's page, and this must be an oversight because the cargo planes that he wants to build could bring post-war Paris fashions to U. S. women overnight. Not only has Mr. Kaiser provided the newspapers with personality copy that recalls the Lindbergh era, he also has so enthralled editorial writers that "experting" on the cargo plane question has become a daily "must." The purpose of this little dissertation is not to add to the confusion over cargo planes, but it is to heap some more praise on Mr. Kaiser. By turning in the best front-page performance of any construction man in memory, he has done a public relations job of great value to the construction industry. Usually it is a politician or a professional promoter who gets the headlines on projects of national scope. That this need not always be so, Henry Kaiser, dyed-in-the-wool construction man, has demonstrated in spectacular manner.

Timber Is Critical Too

IT MAY BE DIFFICULT to realize, but timber is fast becoming a critical material. To a nation that has considered its timber supply virtually inexhaustible, such a situation brings the raw materials requirements of this war into sharper focus than ever. Yet there is really no mystery about the developing shortage. Timber experts predicted difficulties more than a year ago, and urged that plans be formulated to meet them. Beyond a lumber freeze order that put the industry on a 100 percent war footing, however, little was done. Timber is short, not in total board feet produced, but in special vital classes of timber products, a situation that is daily growing worse as structures are changed from steel or concrete to wood. Long timbers for bridge beams or building truss chords are far below demand. Plywood in substantial size pieces is scarce. Production of dense grade timber for high strength service is so inadequate that even the Navy is experiencing great difficulty in getting the 1,400#*f* stress grade for a large number of trusses that were changed first from steel than to concrete and finally to timber in an effort to conserve steel. The problem is one of freeing the timber industry from its squeezed position between mounting demand on the one hand, and a lack of production equipment and manpower on the other. So long as steel, both structurals and bars, is unavailable, nothing much can be done to reduce demand for timber. But production can be stepped up if timber producers are given better priorities on equipment and better protection against labor migration to shipyards and airplane plants. Joint action by the War Production Board and the War Manpower Commission is imperative if timber is to be available to war agencies that need it.

Stronger Bridge Fenders

THE ACCIDENT that befell the Chesapeake City lift bridge over the Chesapeake and Delaware Canal recently, because it follows the pattern of too many other accidents to waterway bridges, should arouse serious thought on the part of engineers as to preventive measures. When a ship wrecks a bridge it usually does a thorough job of it, and a large investment is irretrievably lost. Therefore, a considerable expenditure to protect against such loss would seem justified. If a high-level long-span bridge is not out of the question economically, it, of course, offers the best protection; this solution, for example, was used at St. Georges, Del., at the opposite end of the Chesapeake and Delaware Canal from Chesapeake City, after the lift span there was wrecked by a steamer only three years ago. If the piers of a bascule or a lift span can be kept upon the bank, that, too, will be effective. But if the piers must be in the water, no matter if they are outside the channel, they are vulnerable. Practice is to protect such piers with fenders of timber or sheet piling, but in general the design of these structures represents little more than a gesture in the direction of pier protection. Why can't fender designs be made sturdy enough to deflect or at least slow down a ship? The answer is, of course, that they can, but that they would be expensive. It also is expensive to replace a 260-ft. lift span such as that at Chesapeake City.

Desirable Qualities

IT IS TOLD of the late Hugh Cooper that while he was in charge of construction of the dam as Muscle Shoals he used to tour all operations late at night to see how things were going. On one such tour he went into the exploratory heading in one of the abutments where core drilling was in progress. At the heading the young engineer charged with checking the cores as they were withdrawn was reading a magazine to help pass his idle time. The first he knew of Cooper's arrival was a question from Cooper as to the character of the material in which the drill was then working. Somewhat embarrassed by being caught reading a magazine, and knowing Cooper's insistence on accuracy, the young man replied, "I don't know." "That," said Cooper, "is the correct answer. You could not know the character of the material until you saw the cores." And after adding that he had no intent to criticize the young man for reading while waiting for the cores to come to him for checking, Cooper sat down for a chat before continuing his rounds.

This incident serves in a homely way to emphasize a characteristic that should be dominant in an engineer—unwillingness to accept anything as a fact until it is known to be so. Cooper wanted to know exactly the kind of material the drills had reached, not what the inspector guessed they had reached. Some of the most costly litigations in the construction field have grown out of careless assumptions on the part of engineers as to underground conditions about which they had incomplete information.

There is another lesson in the incident, namely that good human relations are the basis of leadership. Hugh Cooper was a master in the art of winning the admiration and loyalty of his men. Quick to recognize latent talent, he was equally quick to stimulate it by the genuineness of his interest in the problems and aspirations of his men. He was never too busy for an occasional friendly chat, never too preoccupied with his own problems to stop and draw his men into a discussion of theirs; and in his own dealings with his clients he gave his men much to emulate in this respect. Early in their career he impressed upon his men the dignity and importance of their position. When he sent a young engineer anywhere to represent him, he insisted that he travel by the best available means of transportation, stay at the best hotels, and appear at all times as a person of some importance in the world. The value of this practice in building up the confidence of his men in their own ability was demonstrated many times. It is an example that could be followed much more extensively in the engineering profession.

Post-War Public Works

PRESENT HALT OF ACTIVITIES in post-war public works planning clearly reflects pre-occupation with the immediate necessity for winning the war. This is not to intimate that post-war plans have been relegated to a distant future when victory has been assured. Rather it implies that first things should come first, and at the moment post-war planning is secondary to another job. Furthermore, changes wrought by the war are so profound—and will be greater as the drive to victory reaches its climax—that plans projected now probably would call for re-orientation. In the matter of funds, for example, no predictions can be made as to the policy of the federal government in financing works construction. Nor can the attitude of the public in regard to voting local appropriations be judged at this early date. Even the type of public works that will be most in demand after the war cannot now be predicted with certainty. Any realistic approach to post-war planning will have to take into account factors such as these.

No one can question the wisdom and necessity for advance programming, but not until the shape of things to come is more clearly defined can definite plans be drawn. Undoubtedly this is recognized by the National Resources Planning Board, and explains, in part, why this body has temporarily curtailed cooperation with state and local post-war planning groups. Close to the scene of national policy-making and with facilities for exploring future developments, the board is in a position to state objectives and define methods for reaching them. When the time comes for such a statement post-war planning of public works again can be pushed with vigor and direction. In the meantime, local government units would do well to do what tentative planning they can, at least to the point of compiling such preliminary reports on possible public works needs as their reduced staffs are able to undertake.

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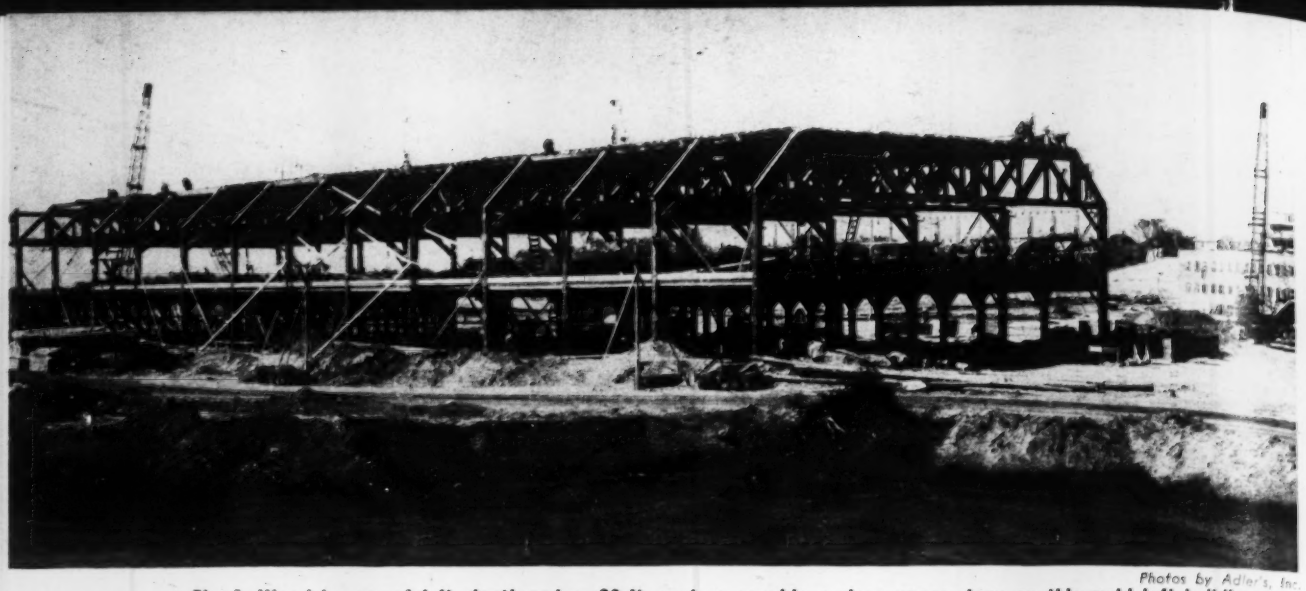


Photos by Adler's, Inc.

Fig. 1. Wood trusses of 6-ft. depth and on 20-ft. centers provide a clear upper story on this mold loft building.

Large Mold Loft of Timber Construction

***Contents in Brief**—At a new shipyard on the eastern seaboard the necessary two-story mold loft building is being constructed of wood. The first floor is of concrete laid on the ground and the second floor—to provide a rigid working area for laying out the molds or patterns—is on pile footings and columns independent of the first floor. The entire area of the top floor is kept free of columns by supporting the roof on 7-ft. deep transverse trusses.*

A two-story, timber-frame building will fill the requirements for a mold loft for the construction of 10,500-ton Liberty freighters by the Rheem Manufacturing Co. at an eastern port where a new yard is being constructed under the direction of the U. S. Maritime Commission. Only about ten tons of steel will be needed for a building that might have required 370 tons of steel if the more common steel-frame mold loft had been built. The time for construction is expected to be about the same for the wood structure as for the other type.

The first floor is given over to offices, storage rooms, toilets and locker rooms, while the top is for planning and cutting templates that are used in the nearby fabricating plant for molding ships on the ways. This arrangement required that the entire top story of the mold loft be free of columns and that the finished second floor be of wood construction and extremely rigid. That the top floor be free of construction joints for its entire length was an added restriction in designing the structure.

The building is located on earthfill where some subsidence is expected. The interior columns each rest on three 15-in. dia. wood piles, and the exterior columns are supported by four-pile clusters. To reduce to a minimum the effect of settlement of the earthfill, the 8-in. thick, double-reinforced ground floor is built independently of the 2½x4-ft. blocks employed as pile caps.

Large interior columns

Support of the second floor is obtained with 8x12-in. pine columns on 20-ft. centers longitudinally and a 15-ft. spacing transversely. On these posts rest 12x16-in. transverse fir beams into which 8x12-in. fir joists are framed on 5-ft. centers. By use of splice plates at all joints in the beams and joists expansion joints are eliminated throughout the building's entire length. Increased rigidity is provided by heavy bracing at both the interior and exterior columns; at each interior column a pair of 2x6-in. diagonals is used on all sides (Fig. 4), while at the exterior columns two 2x6-in. braces are used on the inner side (Fig. 2).

Fig. 2. The 12x16-in. floorbeams at the 8x12-in. exterior columns are braced by 4x12-in. brackets. Diagonal bracing and splice plates result in a very rigid joint.

To provide necessary rigidity to the second floor, which is designed for a live load of 100 lb. per sq. ft., a 2x6-in. yellow pine tongue-and-groove planking covered by 1¼-in. thick, kiln-dried, white pine flooring with a 3-in. face is employed. The planking is laid transversely, and the top flooring is placed diagonally. In order that the work of laying out the templates can be most accurate, the

Fig. 3. Mold loft building complete except for hanging the wooden doors and construction of the interior partitions.

floor is being finished by sanding machines and is to be given two coats of gray, oil paint.

To make the top floor clear of columns, 7-ft. deep transverse wooden roof trusses on 20-ft. centers are used to provide a 10-ft. clearance from roof framing to finished floor across the full width. The bottom chord of each truss consists of two 4x12-in. timbers spiked together, while a single 8x12-in. timber is used for the top chord. The vertical member at the first panel point is composed of two 3x16-in. timbers, but the other verticals consist of a single 6x6-in. post. The diagonals vary from two 3x6-in. to two 3x10-in. members. All the joints are bolt-connected through steel gusset plates, except for the splices in the compression members, where wood splice plates were employed. At each end of the trusses where they join the exterior columns a diagonal knee brace consisting of two 3x10-in. timbers is added to provide rigidity.

Continuous purlins employed

Purlins of 6x12-in. timber on 7-ft. centers span the 20-ft. spacing between trusses to support the roof, which is 2x6-in. D.&C.M. pine lumber covered with three-ply, built-up roofing. To make all the purlins act as continuous members a bolted joint is used over each truss. The purlines also are bolted to the trusses.

The exterior walls consist of 2x6-in. yellow pine studs on 16-in. centers covered by a 1x6-in. yellow-pine sheathing 7/8 in. thick and laid diagonally followed by a layer of building paper, and all covered with a 10-in. wide ship lap siding. In the first-floor walls a 3x5-ft. wood-frame window is used in alternate bays, while a 10x10-ft., wooden door is required in the intermediate bays. In the top story a nearly continuous band of the 3x5-in. wood-frame windows is used in the side walls.

Heating of the building will be by unit steam heaters, one unit to be installed on each floor for each 20 ft. of the building's length. Artificial lighting of the structure on the first floor will be by 500-w. incandescent lights on 20-ft. centers. On the top floor similar lights will be used, but the spacing will be 10 ft. each way. The second floor natural lighting will be aided by a 5x20-ft. monitor light in each bay, in addition to light from the side wall windows.

Rapid construction

Three weeks after the first piles were driven the entire framework was

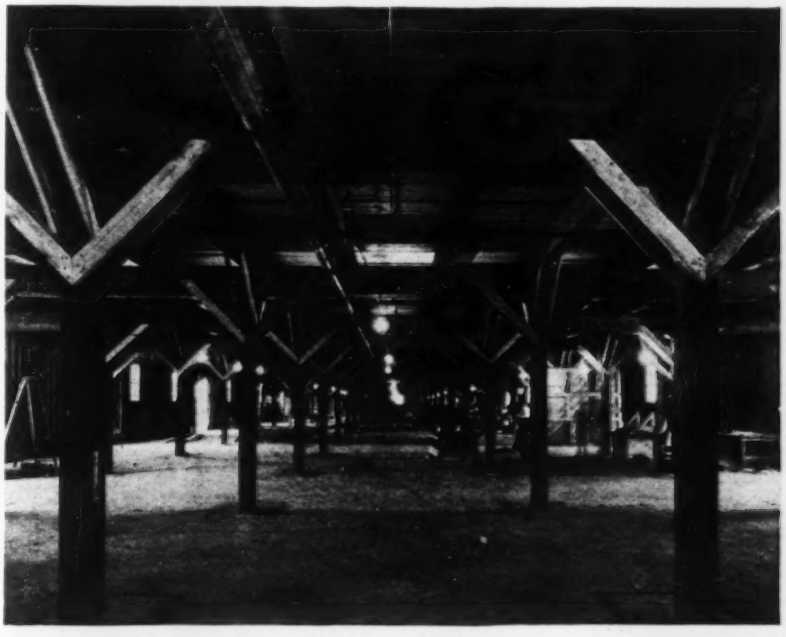


Fig. 4. Top floor is supported by 8x12-in. pine columns on 20-ft. centers longitudinally and 15-ft. transversely. The transverse beams over the columns are 12x16-in. fir timbers and the joists are 8x12-in. fir members on 5-ft. centers. Note steel plates that make beams and joists continuous and heavy bracing at top of columns.

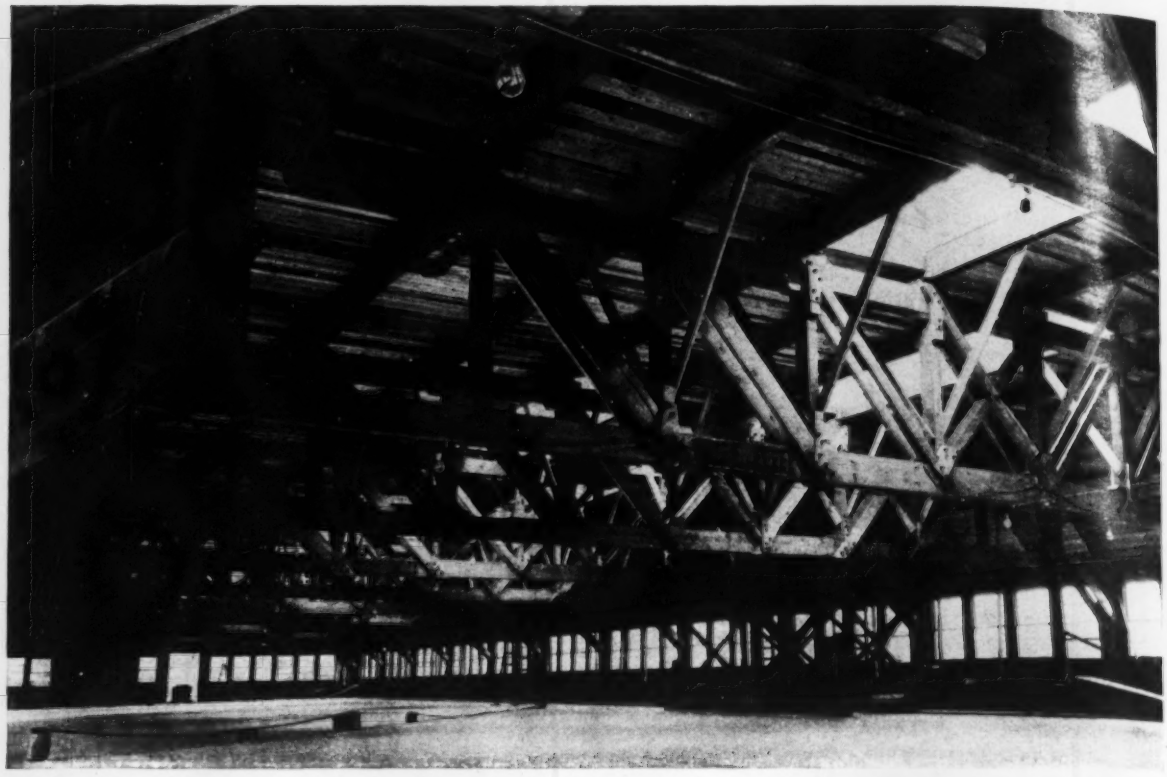


Fig. 5. Mold loft was made free of columns by use of 7-ft. deep transverse timber trusses on a 20-ft. spacing. Note truss bracing at columns and in the longitudinal direction to add rigidity to the roof framing.

complete and in four weeks the top floor at one end was ready for occupancy. A 15-ton truck crane with a 50-ft. boom erected the columns and beams and a similar crane delivered the materials. As the 12x16-in. beams of the second floor were placed, the joints located over the columns were made by two ½x12-in. steel splice plates. Where they joined the exterior columns, the beams rested on a 4x12-in. wooden bracket bolted to the column. The beams also were joined to the exterior columns by two ½x12-in. steel plates.

Bolted joints for joists

Where the beams were in place, the longitudinal 6x12-in. joists were erected. As mentioned previously, bolted joints were used for all the joists. While the wood planking for the second floor was being laid, the crawler crane erected the wood trusses, which had been assembled at a central yard. Each truss weighs about three tons and 15 men could assemble one truss in a working day.

The concrete slab for the first floor, which is reinforced with two layers of mesh, was constructed after the building had been enclosed. Concrete for this work was delivered by transit-mix trucks.

On the mold loft building a peak force of about 200 men was employed on two ten-hour shifts. For the U. S. Maritime Commission, John J. Cunningham was resident plant engineer; for Brown & Matthews, the general contractors and engineers, E. J. Donnelly is superintendent. For the shipbuilding division of the Rheem Mfg. Co., W. H. Innis is in charge.

How Cities Secure O.C.D. Funds

MUNICIPAL FUNDS now being spent for civilian defense are coming from a variety of sources, information from the Municipal Finance Officers Association indicates. While many cities are continuing the earlier practice of appropriating from their general or contingency funds to finance defense activities, some are making special tax levies, others resorting to fund-gathering from the public.

For the larger cities, recent figures show that San Francisco, which had appropriated $12,000 prior to Pearl Harbor for civilian defense and $657,294 more from various city funds by May 1, has budgeted nearly $1,500,000 for 1942-43 for the purpose. Included in this budget are $280,655 for the civilian defense council, $355,000 for the fire and police departments, $35,000 for health activities, $70,000 for the department of education, and $635,000 to meet interest and redemption charges on $1,250,000 in bonds issued this spring to finance auxiliary fire fighting and pumping station facilities. In addition $43,000 has been appropriated by ordinance to buy steel helmets and $22,000 for identification tags.

The San Francisco civilian defense budget is only slightly less than the amount New York City reported spending for 1941-42 — $2,000,000 out of accruals, appropriated to meet "immediate" expenditures.

Of the other western cities, Portland, Ore., budgeting for civilian defense this year for the first time, earmarked $260,000—85 cents per capita —for the new municipal activity, plus $30,000 for auxiliary pumping equipment.

Rochester, N. Y., estimates a $250,000 expenditure in 1942 for municipal defense services, financed from real property taxes.

Two Keys to War Plant Speed:

Construction Roads and Local Materials

***Contents in Brief**—Construction of some of the earlier ordnance plants was hampered by delay in providing suitable roads throughout the area, but at the projects now being built the roads are given first attention with resulting speeding up of work. One of the best networks of roads found on any of the new jobs is that at a large ordnance plant on the Midwest prairies. Bases of the permanent roads were rushed for handling construction traffic. A further aid to speed was the use of local mine wastes both in the road bases and in concrete as aggregate. Tile, another local material, was utilized in most of the building walls.*

THE construction industry learns fast, and one important lesson learned in building the earlier, unprecedented ordnance and munitions plants was the value of getting an adequate system of roads through the area at the earliest possible moment for construction use. Another lesson learned, especially important since certain building materials became scarce, is the advantage of using local materials whenever possible.

Both of these factors are prominent in the construction of a large ordnance plant now being built on the Midwest prairies. Permanent roads were laid out, graded and their foundations built at the very start of the job so that they would be available for construction use. Chat mine waste from nearby sources was used as part of the road metal, and later on as concrete aggregate for building foundations and concrete structures. The engineers also took advantage of the plant's location in the heart of a clay tile manufacturing district by designing practically all building walls of hollow tile, which was also used for most of the firestops although the explosion-proof barriers were made of concrete.

Substitution for critical materials was carried out further in the use of pre-fabricated wooden trusses for all buildings. In addition, the ramps connecting the various manufacturing buildings are of pre-fabricated wooden wall and roof sections. Conservation of metal is also found in the boundary fencing, where four strands of barbed wire on wood posts were used instead of the conventional link fencing, which on this job is confined to enclosures of the various manufacturing areas.

Scope of the job

The project covers an area of about 40 sq. mi. There are 427 buildings, including 183 concrete igloos, 62 sentry towers and 37 gatehouses. A list of quantities of principal materials involved is given in Table I, and the equipment required for construction is listed in Table II. Nearly 8,000,000 cu. yd. of grading was required for the building sites, railroad, highways and parking areas.

At first an extensive system of railroads was planned to cover the job, but because of the success in early roadbuilding and a desire to save critical materials wherever possible, the railroad mileage was greatly reduced and the road mileage correspondingly increased. Thus, there are only 30 miles of permanent railroad on the job, plus three miles of construction railroad, while the highways add up to 101 miles.

Utilities also involve large quantities. There are 77,215 lin. ft. of permanent sewer lines and 21,863 ft. of temporary sewers and drains, all 6, 8 and 12-in. tile. The sewerage system includes three lift stations and a 1-mgd. treatment plant. The water system, designed for 25-mgd., includes a surface supply and a 1.5-mgd. filter plant, a well of 1,000-gpm. capacity, four 200,000-gal. elevated steel tanks, and one 8,000,000-gal. storage pond, with two pumping stations for fire protection. The water system is served by 212,000 lin. ft. of cast-iron water pipe

Fig. 1. Tough going in building a road. Three tractors pull and push a scraper removing sticky muck from the subgrade.

Fig. 2. Building up one of the road surfaces by blade-mixing coarse and fine chat.

from 2 to 12 in., laid with compound joint material. In addition there are 35,000 lin. ft. of temporary cast-iron water lines. Permanent electric power lines aggregate 50 miles, in addition to 22 miles of temporary lines.

Another indication of the size of the project is the fact that when construction was only two-thirds complete the architect-engineer had already used up 54 miles of 36-in. blueprint paper.

Roadbuilding methods

Highway construction was started late last fall under most adverse weather conditions. First it was necessary to scrape off from 2 to 2½ ft. of sticky, silty loam overlying a stratum of hard clay. The foundation and ditches were graded down into the clay. The over-burden spoil was piled up alongside the road, later removed where it interfered with building operations.

After grading was completed, a 4-in. layer of hard flint chat, maximum 1¼-in. size, was spread over the road bed and bound up with fine soft chat. Under some rolling and heavy traffic this resulted in a 4-in. compacted road foundation that served adequately for construction traffic through the winter.

When the weather became better in the spring final construction of the roads was started. The first step was to spread a 4-in. loose layer of crusher-run limestone, maximum 2½-in. size, over the old base. Processed into this by blade mixing was fine soft chat in the proportions of two parts limestone to three parts chat. This mixture was bladed, watered and rolled into a 3-in. compacted layer. Then another 3-in. lift was added with the same materials, proportions and process.

Next a layer of fine soft chat was spread to a thickness of 1½ in. and maintained under traffic for some time for thorough compaction. Then the loose material on top was broomed off and the surface shot with light SC oil and immediately covered with the broomings. This surface was opened to traffic for four days.

The next and final step was to broom the surface again and shoot with 95 plus oil. Covering with the sweepings finished the road. Main roads are 22-ft. surface with 3-ft. shoulders; secondary routes are 12-ft. surfaces with 4-ft. shoulders.

This design of road was worked out by the contractor's project manager, a former state highway engineer.

Details of the buildings

The buildings are designed almost entirely for the use of local and substitute materials. In general they have concrete foundations and floors, wood columns and roof trusses, and 8-in. or 12-in. hollow tile walls. Wood purlins are set on top of the roof trusses, and the roof consists of asbestos or asphalt shingles nailed to 1-in. diagonal wood sheathing. In boiler houses and a few manufacturing buildings the roofs are asbestos-protected metal. All partitions, except explosion barriers, are hollow tile. The manufacturing buildings are sheathed on the inside with insulating wallboard. Storage buildings are not lined. Lintels and sills are concrete, either pre-cast or poured in place.

The magnitude of building operations is indicated by the quantities involved; there are more than 22 million b.ft. of lumber and over 3,500,000 hollow tile units. Also required are some 150,000 cu. yd. of concrete and 7,228,000 lb. of reinforcing, largely in the igloos. Chat is used as coarse aggregate in the concrete.

Connecting the various buildings in each manufacturing unit are 16-

Fig. 3. Timber roof trusses and walls of local hollow tile are structural features of most buildings on the project.

285 lin. ft. of wood-covered concrete ramps. At regular intervals the wood continuity is broken by a section of fireproof walls and roof. The fireproof walls are hollow tile and the roof pre-cast lightweight concrete slabs carried on a concrete frame.

Some of the buildings are divided by barriers of reinforced concrete that extend high above the roof to localize the damage from possible explosions.

Fabrication of the timber roof trusses and columns at a central carpenter shop was one of the outstanding features of the project. The methods used in turning out 1,050 trusses at the rate of 28 per 8-hr. shift will be described in a subsequent article.

Organizing the Job

The job was exceptionally well organized for construction, especially in the establishment of temporary facilities for construction purposes. This contractor did not make the mistake found on some similar big projects of failing to provide facilities and equipment commensurate with the job to be done, as evidenced by the equipment listed in Table II and the list of temporary buildings and utilities shown in Table III. In the latter table the figures of 16,800 sq. ft. of contractor's office space and 7,500 sq. ft. for subcontractors, and 136,721 sq. ft. in temporary field buildings are significant.

The contractor divided operations into several divisions. The office and administrative force reached a peak of 288 officials, engineers, technical help, clerks and typists. In the materials handling division, which includes the motor pool, employment runs from 500 to 700, though a peak of 1,200 was reached early in the construction stage. A maximum of 860 employees was assigned to the igloo division, which also installs the fencing, culverts and miscellaneous items. Building construction requires the greatest force, and this division totals 3,300 workers. In the utility division, which handles all sewers and water lines, the sewage plant and water filtration plant, reservoirs, power and light lines and area lighting, are about 600 persons. The peak labor load for the heavy division, which builds the roads and railroads, bridges, parking areas and heavy grading, was 1,537 employees.

Three divisions are subcontract

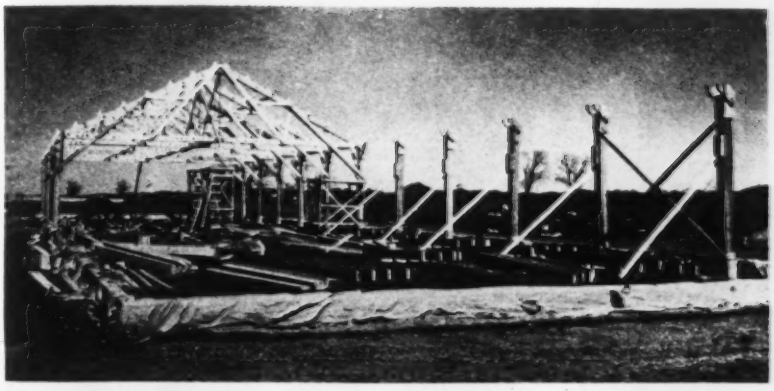


Fig. 4. Erection of prefabricated timber columns and roof trusses. The latter turned out in a central plant at the rate of 28 per 8-hr. shift. The truss knee braces, part of the web system, are added in the field.

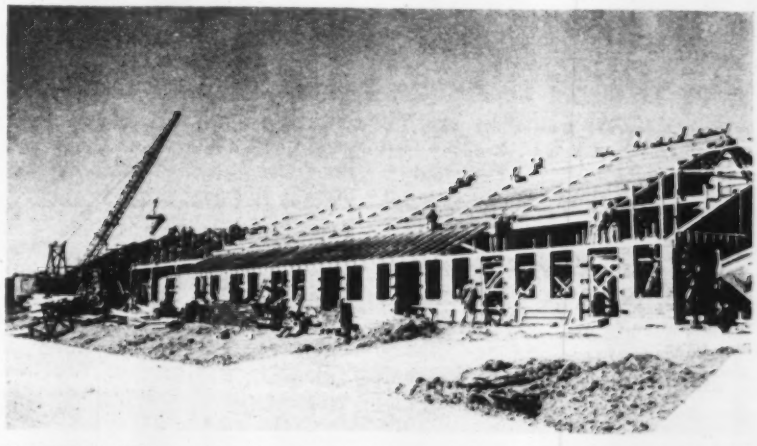


Fig. 5. On buildings wider than standard truss spans, columns are set in from the walls, and the roof extended by rafter bracing on the walls. Crane and bucket placement of concrete for the explosion wall in the background is typical of concreting operations.

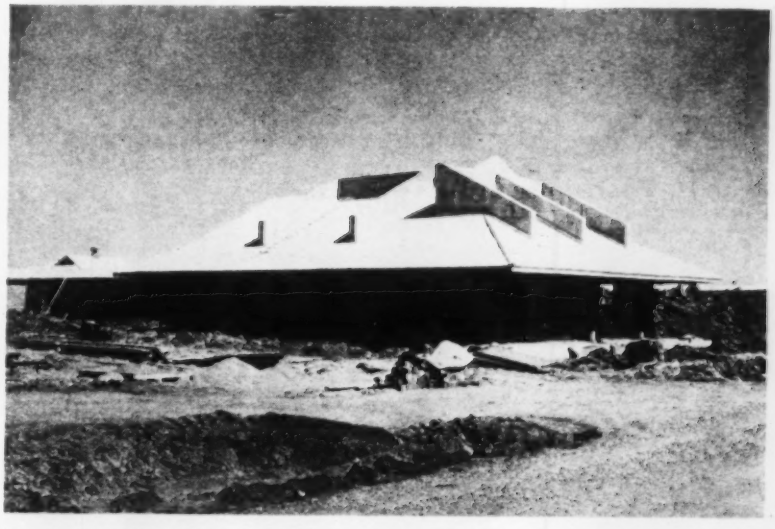


Fig. 6. Explosion walls extend above the roof line to minimize possible damage. They are of reinforced concrete, whereas the other parts of the building are timber and tile. This building is divided into a number of "safety" cubicles.

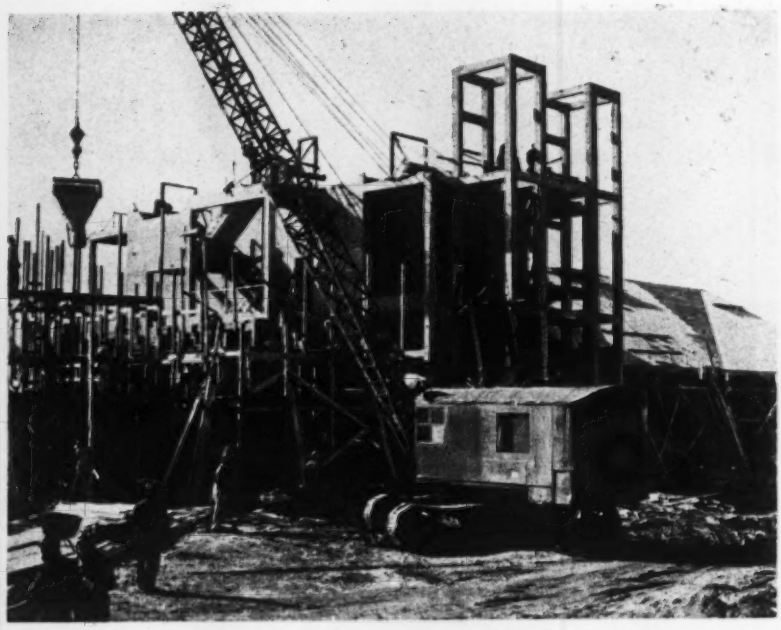


Fig. 7. Concrete frames are used for the powerhouses and in a few fireproof manufacturing buildings. Crawler cranes place all concrete above ground.

TABLE I—QUANTITIES OF MATERIALS USED ON THE JOB

Item and unit	Quantity
Concrete, cu. yd.	150,000
Reinforcing, tons	6,300
Sewer pipe, vitrified, 6 to 12 in., ft.	85,575
Concrete pipe, 12 to 60 in., ft.	23,104
Drain tile clay, 4 to 6 in., ft.	36,750
Water pipe, cast iron, 2 to 12 in., ft.	212,000
Power lines, miles	50
Lumber, 1-in., M.b.m.	9,068
Lumber, dimension, M.b.m.	13,018
Insulation, s.f.	213,000
Wood doors, ea.	1,072
Steel sash, ea.	3,424
Corr. metal pipe	9,450
Sand, tons	133,875
Chat and stone, tons	1,086,750
Cement, bbl.	222,600
Leadite, lb.	94,500
Concrete block, ea.	68,250
Hollow tile, ea.	3,536,571
Copper wire, lb.	283,500
Misc. bolts, tons	237
Asphalt shingles, squares	4,462
Asbestos shingles, squares	25,500
Waterproofing, sq. ft.	975,000
Paint, gal.	42,000
Pipe covering, lin. yd.	105,000
Floor hardener, sq. yd.	6,000

TABLE II—MACHINES REQUIRED TO EQUIP THE JOB

Trucks, pickup, flat bed, dump	563
Trucks, water	23
Trailers	8
Truck mixers	27
Passenger autos	60
Station wagons	19
Crawler tractors	97
Tractor-wagons	6
Carrying scrapers	30
Rollers	15
Rippers and blade graders	19
Auto patrols	34
Shovels, draglines, ¾ to 2½ yd.	36
Pull shovels, ½ to ¾ yd.	9
Truck cranes	3
Ditching machines	13
Backfillers	4
Locomotive crane	1
Air compressors	23
Wagon drills	3
Pavers	6
Small mixers	2
Batch and bulk cement plants	2
Vibrators, finishing machines	55
Pumps	32
Portable light plants	95
Arc welders	24
Power saws	18
Boilers	18
Transformers	35
Buckets, clamshell, dragline, concrete	58
Receiving hoppers	12
Pipe threaders	17
Lathes, drill presses	6

TABLE III—CONTRACTOR'S TEMPORARY FACILITIES

Water lines, ft.	34,864
Sewer lines, ft.	21,863
Power lines, miles	22
Office space, sq. ft.	16,800
Subcontractor offices, sq. ft.	7,500
Field buildings, sq. ft.	136,721
Warehouses	14
Guardhouses	40
Outhouses	115
Portable light houses	50
Portable storehouses	31
Blacksmith shops	2
Temp. boiler houses	6
Canteens	3
Carpenter shop	1
Cement storehouses	2
Timekeeper's shanties	90
Equip. repair shops	4
Temp. fire dept.	1
Subcontractor storehouses	6
Oil storage	1
Powder houses	2

work. These are: Heating and ventilating, 700 employees; interior electrical work, 400; and plumbing, 250.

Earthmoving was by shovel, dragline, truck and tractor-wagon units and by carrying scrapers. Table II shows the number of machines involved. Concrete operations were early brought to a high degree of perfection. Two batching plants were set up on railroad spurs, with a theoretical capacity of 4,000 cu. yd. per 24-hr. day. However, the erection of forms, transportation, weather and other factors have kept the actual concrete production down to about 3,000 cu. yd. per day with an average haul of three miles. Stone or gravel were not readily available, so a satisfactory concrete mix using flint chat as coarse aggregate was worked out after considerable laboratory and field experimentation.

Concrete is mixed and handled in two ways. For large pours, such as igloos and concrete unloading docks, a paver is placed at the job and materials are hauled dry-batched from the batching plants. For smaller pours, such as building foundations or isolated explosion walls, concrete is mixed and hauled in transit mixers charged at the batching plants. All placement above ground level is by crane and bucket.

Igloo construction

On all igloos the special steel form developed by Universal Form Clamp Co. is used, consisting of double-trussed ribs and steel pan sheets between the ribs, both for inside and outside surfaces. The igloos are of the new design with ventilating chimneys at the back and vent slots in the door. All inside steel form sections are designed to pass through the door.

Foundations and floors of the igloos are poured well ahead of the arches. The contractor developed a novel means of protection for the floor-finishing operations. A series of wooden truss frames or horses about 6 ft. high were designed to span the width of the floor. As fast as the floor is poured the horses are set up in sequence and covered with a waterproof trussed roof section. Side sections of canvas complete the inclosure, so the finishers can work regardless of weather. Each protection unit is equipped with a gasoline-engine generator set for furnishing power for lights. The lights are permanently installed in the roof sec-

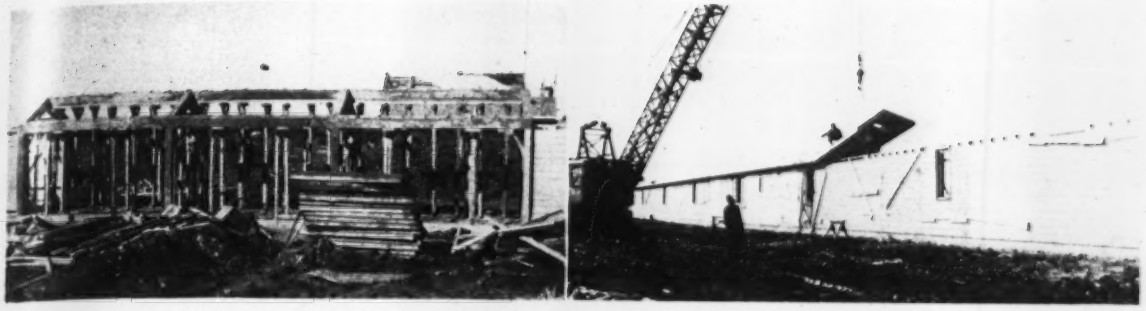


Fig. 8. More than 3 miles of prefabricated wood-covered ramps (right) connect the manufacturing buildings. At the left is a concrete-frame firestop ramp section, which will be covered with tile walls and lightweight-concrete slab roof.

tions, requiring only plugging in as the sections are assembled.

All other forms are made up in 4x8-ft. panel sections of $\frac{9}{16}$-in. plywood and are used as many as 16 times before rebuilding.

Building construction

After a building site is graded and the foundations poured, the next step is erection of the timber columns and trusses. These are delivered by special trailers from the central fabrication shop. The columns are first set up with cranes and bolted to the foundations and temporarily braced. Then the trusses are set on the columns by cranes, and the knee braces and longitudinal bracing are placed by carpenters working from rolling scaffolds. Next triangular blocks to hold the roof purlins are nailed to the top chords of the trusses, and the purlins are set on top of the trusses.

Just as soon as the columns and trusses are in place the laying of the tile walls is started, and the masonry work is carried along with completion of the roof by placing the diagonal roof sheathing and shingles. Where concrete explosion walls are called for, these are built first, ahead of column and truss sections, because roof purlins frame into sleepers bolted to the walls, and also it is desired to keep the forms out of the way of timber erection.

The contractor found it necessary to make a lot of items on the job that, under ordinary circumstances, would be purchased on the outside. This is particularly true with respect to sheet-iron, light-iron and wood products. Shops set up for this purpose were also utilized for making many items for operation of the plant, such as heavy furniture, wood tables, cabinets, lockers and bins.

Installation of two-way generator-type short wave radio sets in the cars of principal personnel and at strategic points in the Army, engineering and contracting offices has done much to expedite the job.

Contractor's organization

The construction organization is headed by the project manager who reports to a representative committee of the individual firms making up the combination. He is aided by two assistant project managers, one in charge of construction, the other heading up engineering, purchasing and expediting. A mechanical engineer and construction engineer are assigned to the construction manager as assistants.

Construction supervision is broken down into four main divisions: utilities, heavy, igloos and building. Each division is headed by a division manager and an assistant. A general superintendent is in charge of each subdivision, such as grading, railroads, highways, sewers, water, concrete structures and outside electrical work. Building division supervision is by area superintendents.

Under the engineering department come accounting, materials, engineering, purchasing, expediting and personnel.

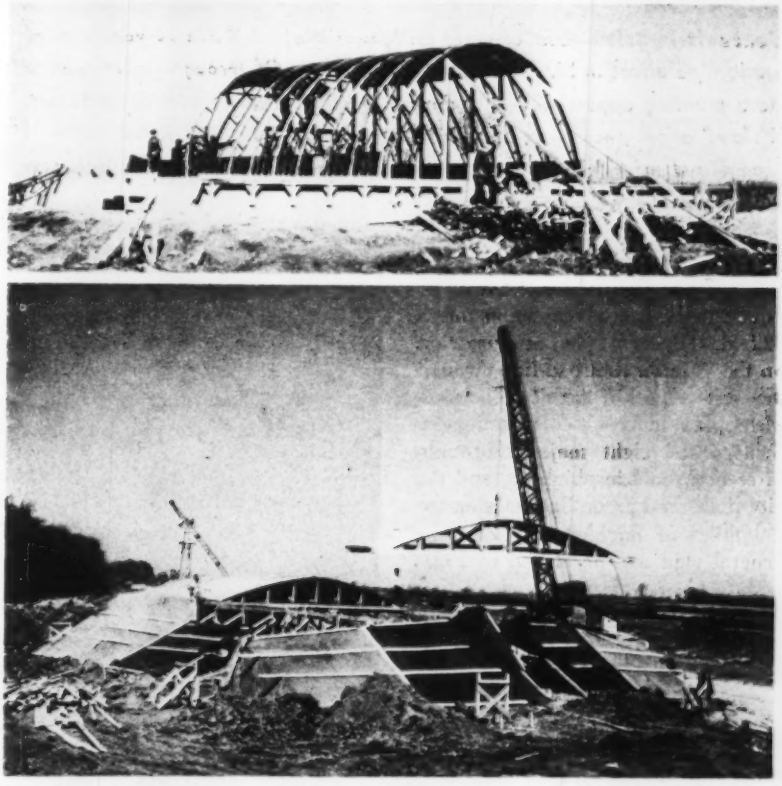


Fig. 9. Concrete igloo construction is one of the major items. At the top ribs go up for steel panel forms. A trussed-roof finishing protection, canvas covered, is shown at the bottom being placed over a newly-poured igloo floor slab.

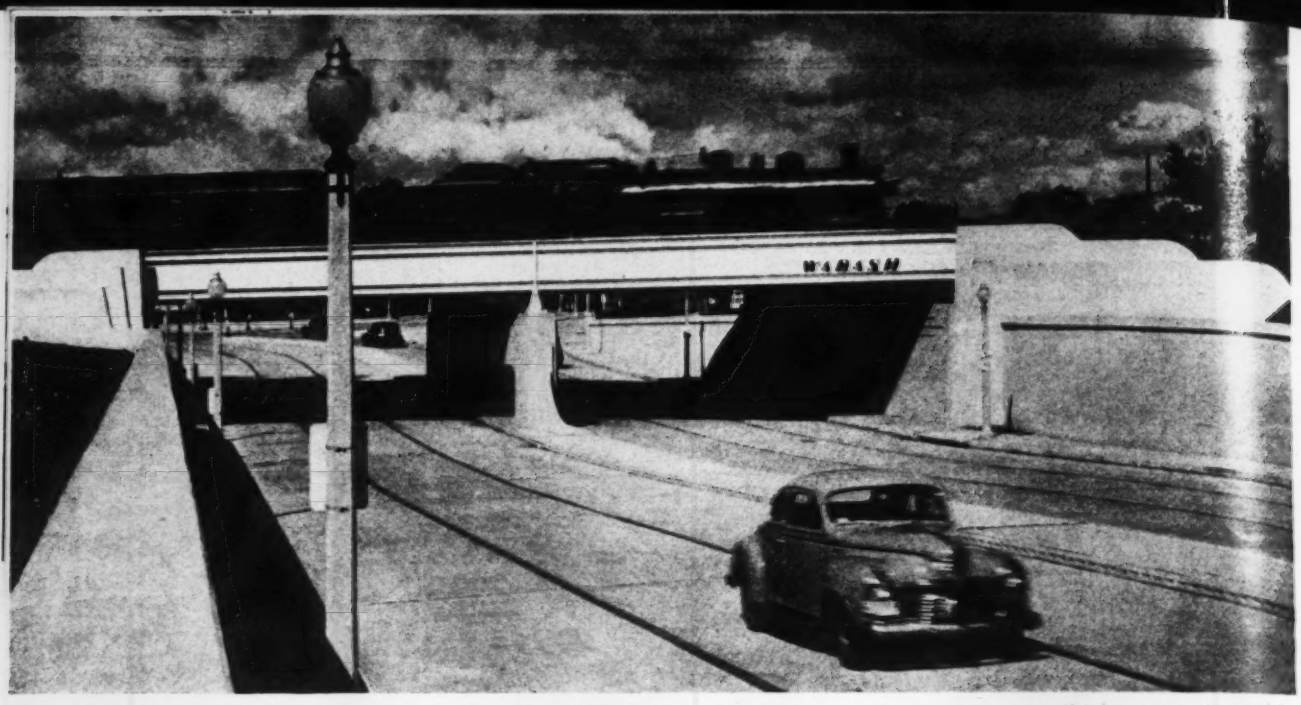


Fig. 1. Highway traffic flows freely under trains carried on an attractive through-girder bridge.

Railroad Underpass Aids St. Louis Traffic

William J. Hedley
Construction Engineer, Wabash Railroad Co.
St. Louis, Mo.

***Contents in Brief**—Last of eight bridges in Wabash R.R.'s 20-year plan of grade separations in St. Louis spans Skinker Blvd. Of through-girder type, a more pleasing appearance is achieved by elimination of outside stiffeners. Welded alloy steel plate floor supports ballastless track. Road traffic is channelized in underpass and for several hundred feet each side, including intersections with approach streets.*

An attractive subway grade separation project recently completed in St. Louis marks the completion of a $2,500,000 general plan of separation on the Wabash Railroad line through the western part of the city. The complete plan included construction of bridges for eight major thoroughfares between Kingshighway and the city limits and grade line revision for 2.9 miles of double-track line. The general plan was developed in 1921, with the first unit of construction started in 1928.

The subway project, just completed at a cost of $450,000, was started in October, 1940. Steel fabrication and erection and all major structural work were completed prior to the current critical material shortage.

The project involved the opening of a new vehicular thoroughfare by an extension of Skinker Blvd. under the Wabash Railroad's two main line tracks and two industrial service tracks, and the abandonment of former grade crossings at Olive Street Road and Maple Ave. (Fig. 2). The construction of adequate intersections and connections between the new and the old routes on each side of the railroad permitted the former grade crossings to be closed without inconvenience to vehicular traffic. The newly established intersections are channelized, and movements throughout the new routes are controlled by traffic-actuated control signals.

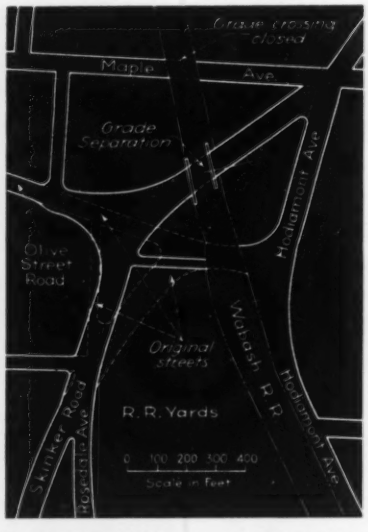


Fig. 2. Completely new street pattern is used in connection with Wabash R. R. grade separation in St. Louis.

The Skinker Blvd. extension has a divided roadway with three-lane pavements on each side of an 8-ft. center dividing strip. Openings through the center strip are available only for major traffic movements, all of which are signal-controlled. This 1,500-ft. stretch of divided pavement is intensively used not only because it handles a large volume of traffic, but also because it serves as a transitory reservoir for the intermingling and dispersal of vehicles from 15 separate routes of major traffic flow carrying approximately 22,000 vehicles daily. These major routes, together with

numerous minor ones, are handled by the traffic-actuated controls at a minimum of delay and interference. Altogether the 36 traffic control signals installed within the limits of this project provide for safe controlled vehicle movements over 67 separate routes. Safety and expedition of movement over these routes are improved by the center dividing strip and channelizing islands.

In addition to providing a safe crossing, the subway structure has attracted attention because of its streamlined design, produced by an adaptation of functional structural units to enhance appearance. The general design and details of the structure were developed with careful attention to two general conditions: first, the physical limitations established by grade and drainage restrictions; and second, a desire to have the structure pleasing in appearance.

The railroad grade line was fixed by the fact that the structure was located only 1,300 ft. from Delmar Station, where all trains stop. This short distance, together with existing grade line conditions, limited track elevation to 8½ ft. The logical drainage outlet for the depressed street was a 16-ft. horseshoe section sewer located just 250 ft. west of the structure. In order to make use of gravity drainage to this outlet without installing a sump and pumping plant, it was necessary that the street depression be kept to a minimum.

The bridge is a through-girder type, two-span, four-track structure with four lines of girders. Two tracks are located on a double track floor system between the interior girders, with one track on either side on a single-track floor system supported at one end on the interior girder and at the other end on the outside or fascia girder. A center pier is located in the 8-ft. roadway dividing strip.

In the floor design, ties and ballasts were eliminated, thus reducing the depth of the floor to a minimum. The distance from base of rail to underclearance line in the double-track center section is 2 ft. 3 in., while the total depth for the outside single-track floor systems is only 1 ft. 10¾ in. Floorbeams are spaced at approximately 2-ft. centers. High yield-point alloy steel plates are welded to the top flanges, forming a solid, watertight floor. Above this solid plate, directly over the floorbeams and immediately under each running rail, is an assembly of base plate, insulation and tie plate through which load is transferred directly from the rail to the floor system (Fig. 6).

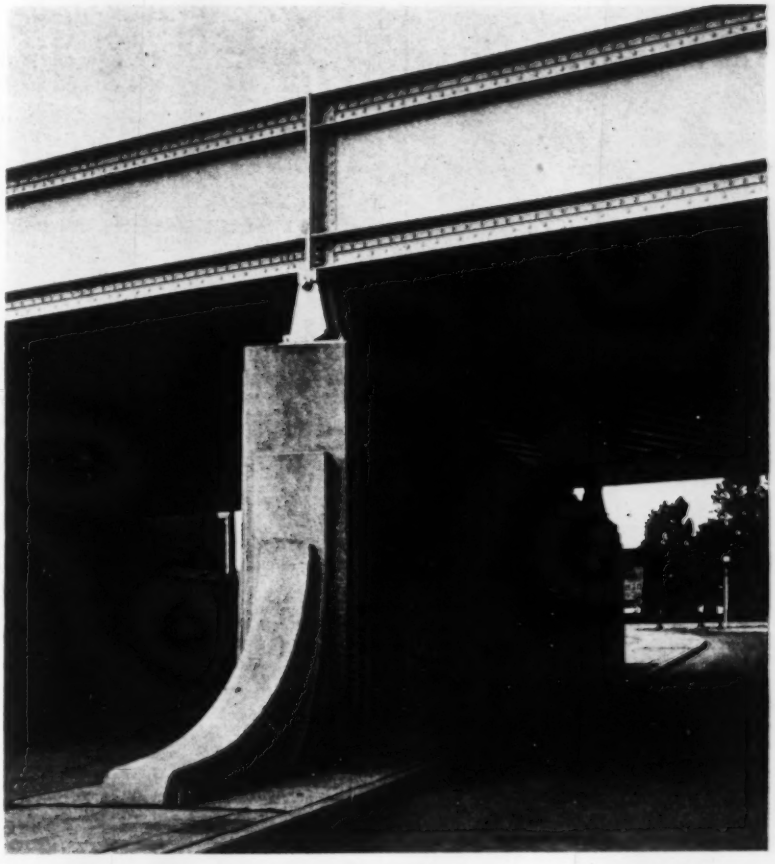


Fig. 3. Appearance of bridge is enhanced by elimination of outside stiffeners and by using a single bearing and shoe assembly for the abutting girders.

The superstructure presents clean straight lines, with a minimum of distracting detail. The flange and web sections are uniform for the full length of the girders. Intermediate web stiffeners are provided on the inside face only and are welded in the area between the flange angles. The two girders are carried on a common bearing and shoe assembly over the center pier, thereby consolidating the end stiffeners into what appears to be one vertical structural member and at the same time practically eliminating eccentricity from the reaction on the comparatively narrow center pier.

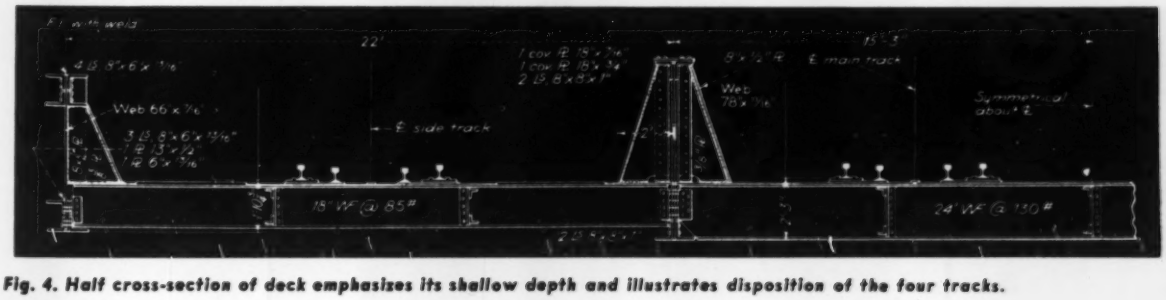


Fig. 4. Half cross-section of deck emphasizes its shallow depth and illustrates disposition of the four tracks.

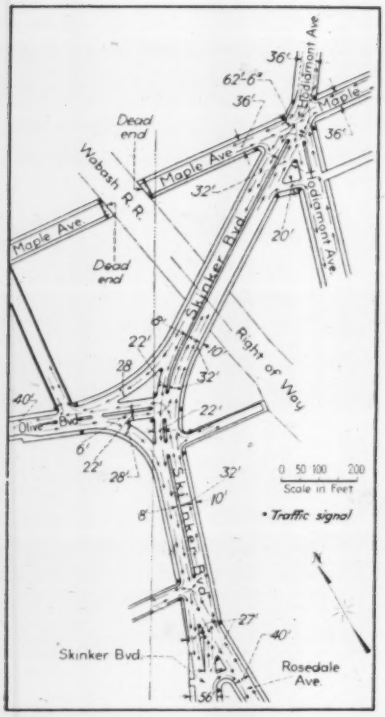


Fig. 5. Channelized traffic lanes lead into and out of the underpass. The extensive light-control system is entirely traffic-actuated.

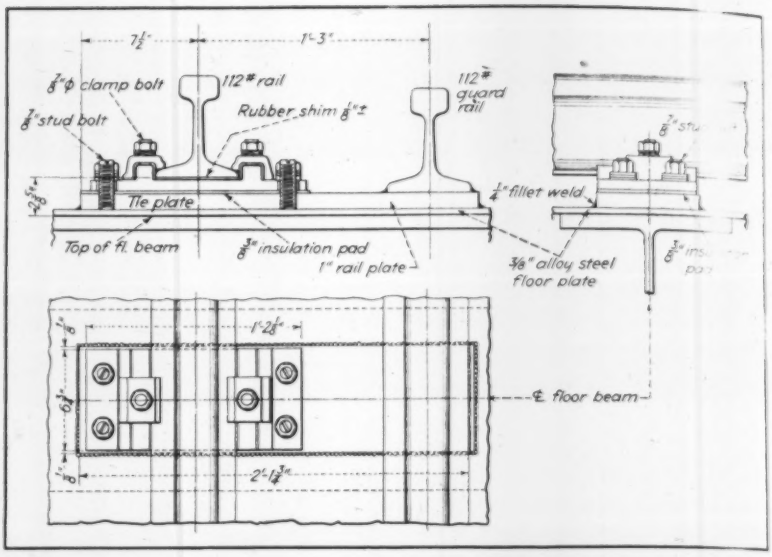


Fig. 6. Rails are bolted to 1-in. thick plates welded direct to the 3/8-in. plate deck at each floorbeam location, approximately 2 ft. on centers.

The "Wabash" sign was cut from ½-in. steel plate and is welded to the top of the bottom flange section, 5 in. in front of the web.

The U-type reinforced-concrete wing walls present plain surfaces and clean lines in harmony with those of the steel. These walls extend up to the top of the girders and forward to the face of the abutments, thus masking the shoes and end stiffeners and emphasizing the substantial nature of the substructure as support for the superstructure. Curved lines at the ends of the wing walls present an appearance of fitting the structure into the embankment.

In order to protect the faces of the abutment and sides of the pier from streaking, the bridge seats are sloped away from the face to drainage channels formed in the top surface of the bridge seat outside of the bearing areas, with outlets to pipes cast in the abutment walls and pier and connected to the drainage system.

Skinker Blvd. is very near the western city limits of the City of St. Louis, and part of this project is within the corporate limits of University City and part in the unincorporated area of St. Louis County. Supervision of contract work was under the direction of Robert W. Hodson, division engineer, Missouri State Highway Department. General contractors were Samuel Kraus Co. and Israel Bros. American Bridge Co. fabricated the steel.

The Wabash Railroad Co. was represented by J. C. Bousfield, chief engineer, and the author. The bridge was designed by D. E. Brummitt of the engineering staff of the Wabash.

Street and drainage plans were prepared in the office of the president of the Board of Public Service, City of St. Louis.

The project was financed by the Missouri State Highway Department, using federal aid grade crossing funds, with contributions from the City of St. Louis, University City, and the Wabash Railroad Co.

Philadelphia Cuts Water Waste

CONFRONTED with the slogan "Don't be a drip!", through radio, press and posters, Philadelphians in a one-month campaign helped turn 65,000,000 gallons of water daily from nonessential to vital war industry use. Told that a dripping faucet wastes 10 to 350 gpd., householders repaired leaky fixtures and eliminated other water waste in a response which officials hope will become habit.

The campaign was undertaken when war industries in the five counties of the Philadelphia area were found in danger of production delay because of water shortage, according to the Council of State Governments. It was requested by the Philadelphia Metropolitan District Council of Defense and directed by the Interstate Commission on the Delaware River Basin, an agency through which Pennsylvania and neighboring states cooperate on water conservation and purification problems.

The three water systems, supplying more than 90 percent of the 2,500,000 water users in the five-county area, have a total maximum capacity of 460 mgd., 20,000,000 gallons above maximum peacetime demands. When it was estimated in May that combined demands by industrial and private users would reach 500 mgd. by late summer—a demand impossible to meet—officials sought help to remedy the situation, and the water conservation drive in June was the result.

The campaign cut water consumption by 30 mgd. in June from June, 1941, despite a 25 percent increase of use by war industries and an expanded population. Considering these increases, engineers estimated an actual reduction of 65 mgd. for nonessential purposes.

Campaign appeals were made through leaflets, posters, newspaper stories and a series of radio addresses. Local councils of defense in the five counties cooperated, and local water departments increased inspection and repairs of hydrants and valves.

Shipyard Uses Basins Instead of Ways

***Contents in Brief**—Behind the protection of a cofferdam made with part of the 2,000,000 cu. yd. of rock excavation, several concrete-lined basins, in many respects resembling graving docks, 100x590 ft. in plan, were built for construction of ships of the C-4 class. Galleries with 9-ft. ceilings, used for storage and small assemblies, underlie craneways between the basins.*

IN CONTRAST with the general practice of building inclined launching ways on which to construct ships, one yard on the West Coast working for the Maritime Commission has constructed several basins 100x590 ft. in plan (inside measure) in which ships of the C-4 class are being built. As these ships are of a type that have horizontal decks and vertical bulkheads, building them on a horizontal keel instead of on inclined launching ways will be a great advantage in making it possible to plumb and level parts and assemblies as they go in. Also, the basins will simplify the process of launching, eliminate need for constructing launching cradles for each vessel, and will provide facilities that may be extremely useful as graving docks in emergencies.

At this yard design and layout has been on an unusually ample and substantial basis. As the latest of a number of shipyards in which the Kaiser Company has an interest, its design would naturally reflect the benefit of operating experience under present conditions. There is generous provision of space for the type of work to be done, substantial construction is characteristic of the buildings, and careful attention has been given to detail. Materials move in a straight line through plate shop and assembly areas to the ways.

Railroad sidings are provided on both sides of the plate shop which is about 80x700 ft. in plan with its upper floor equipped as a mold loft. From this shop materials move directly to assembly areas just inshore from each way. These areas are of the outdoor assembly type but movable, covered frames for weather protection are provided. Between each pair of assembly areas 65-ton gantry cranes move to and from the basins, delivering assemblies to the 50-ton revolving gantries that move on the craneways between basins. The 35-ft. span under the cranes between assembly areas is paved with crushed rock topped with emulsified asphalt. Over it operate trucks and trailers supplementing the deliveries by overhead cranes.

Design of the basins

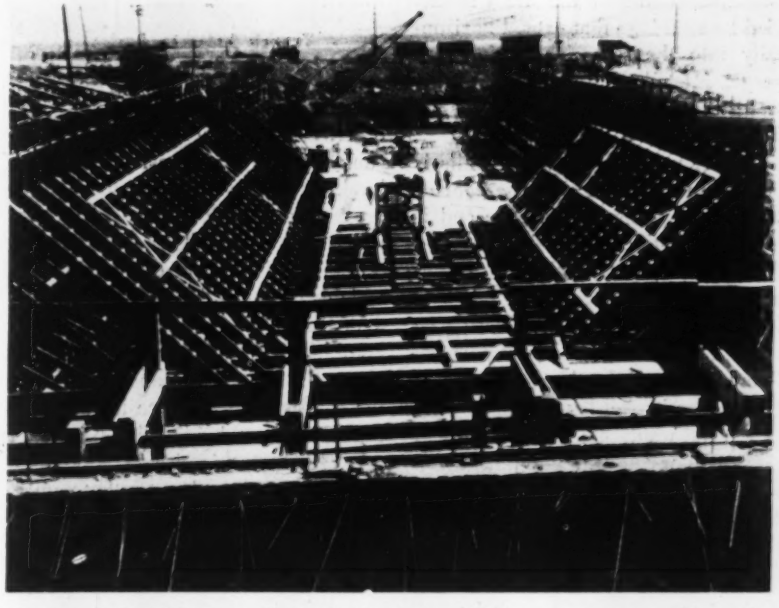
The basins themselves are primarily places to build ships but the intent is to make use of them, after the rush construction program is over, for maintenance and repair of vessels of the type here built.

As all basins are in rock it was possible to take advantage of this solid support in the design of the concrete lining. The cost of side and end walls, which are uniformly 18 in. thick, was greatly reduced by an expedient that afforded many advantages, namely, the construction of a gallery on each side of each basin for its full length.

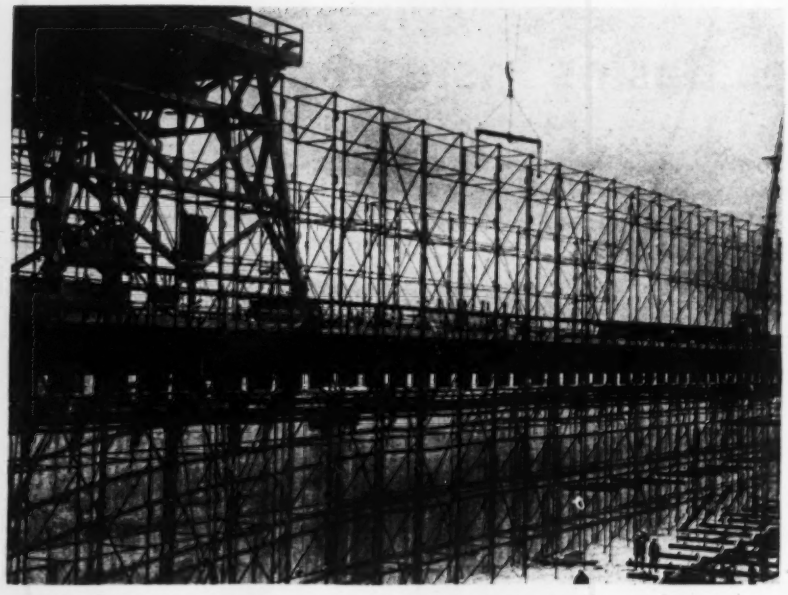
If the side walls had been continued up to craneway level, as was at first intended, the walls would have been higher as would the level of the ties between them. By excavating for a gallery floor to finish at El. +10 and carrying the craneway above on a concrete structure, it was possible to make use of the gallery floor for steel ties between adjacent side walls. These ties are steel bars on close spacings that turn downward at the ends to overlap reinforcing in the side walls. The gallery not only saved the cost of an equivalent amount of space in a separate structure elsewhere, but brought this space to a location extremely convenient to the work.

The gallery is 34 ft. wide; the space is used for storage and for performing such operations as pipe threading, assembly of fittings, etc. The gallery is accessible by stairway; freight is delivered by means of a "hatch" in the deck of the craneway through which material can be lowered directly from the crane to the gallery floor.

Instead of the timber staging commonly used as working platforms for shipways, these basins are provided with steel scaffolds erected on sockets spaced on 5-ft. centers in the concrete of the basin bottom and extending 19 ft. above ground level, a total height of 47 ft. Only the steel framework of these scaffolds will be left permanently in place. The planking used for working platforms will rest upon the



Unexcavated rock between the basins is given an 18-in. concrete veneer. Forms for these sidewalls are shown braced across the basin.



On steel falsework, remaining in place in the basin, timber floors will be laid as needed. Note gallery under craneway between adjoining basins.

framework temporarily and will be moved as the work progresses.

An exception to the 18-in. side wall thickness and the method of taking the thrust at the top, occurs in the outer walls of Basins 1 and 5. Here, where there is no adjoining wall to provide anchorage, a different design is necessary. In Basin 1, where the outer wall is not fully backed up by rock, an inverted T section is used and the wall thickness is 30 in. at the base. The side wall along the outer edge of Basin 5, on the contrary, is in solid rock and here the stress is carried by steel bars that extend horizontally into the rock. These ties converge, after leaving the top of the wall, and are grouted, in groups, in holes driven into the basalt.

Thrust in the inshore end walls is carried to the side walls. The floor of the gallery across the inshore end is made 10 in. thick and is heavily reinforced. This pavement thus constitutes a reinforced-concrete beam, lying on its side, with a span of 100 ft. between side walls to which the stress is delivered. The reinforcing in this beam ties in, for its full length, to the steel of the end wall.

The concrete of the side walls themselves and the rock tongue between them are collectively considered as a dam 34 ft. wide resisting the water load, when one basin is full and the adjoining basin is empty. To strengthen it in this function, the space (overbreak) behind the side walls was backfilled up to the level of the gallery floor. At the bottom, and for the first 4 ft. above basin floor level, the backfill consists of gravel so that seepage will readily find access to the weep holes. Above 4 ft. the backfill consists of a lean concrete mix (two sacks of cement per cubic yard) made with rock from the excavation. This design produces a solid fill between adjoining walls and materially decreases the capacity of the 34-ft. strip to take up water (through weep holes and drains) when the basins are filled.

Tunnels between basins

For convenience of workers in going from one empty basin to another, 5x7-ft. tunnels were put in to connect adjoining basins at floor level. When the basins are to be used separately these tunnels are closed by watertight, steel bulkheads.

In each basin the concrete walls, which were built first, were put in to a depth of 2 ft. below the finished floor level. The floor was made high along the center line and low along the side walls, difference in level between center and side being 6 in. The advantage of this drainage plan is that rain water and water that comes into the basins through the weep holes does not accumulate under the ship and keep working areas damp.

Access for workmen from surface and gallery levels to the basin bottom is by stairways, of which there are four in each basin, two in the inshore corners and one along the wall on each side near the gate end. The craneway is at El. +18, the gallery floor is at El. +10, and the basin floor is at El. —20.

The gate is a structural steel frame with a ¼-in. skinplate. Water seals are effected by rubber belting held in place by the pressure. The gate span (net entrance width) is 85 ft. As the sill is 3 ft. above basin floor level the maximum depth at high tide is 22½ ft.

Each gate consists of two 42½-ft. halves, each handled by one of the revolving cranes on the craneway. (These cranes have 100-ft. booms.) The joint where the two halves meet on the center line is sealed by a strip of rubber belting. In addition to the gates' horizontal trusses designed to take water thrust, a pair of trusses at the top transfer lifting stresses and carry a 12-ft. roadway for pedestrians and light trucks.

Pump chambers are located at the outer end of the craneways on both sides of the middle basin. To these pump chambers (only one of which is to be equipped on completion of the present contract) leads a main drainage tunnel that extends across the outer ends of all five basins. Into this main tunnel open drainage gates in the tunnels that run lengthwise under each basin. Tunnels under the basins are 3 ft. wide and the height increases from 3 ft. at the inshore end to 5½ ft. at the outer end of the basin at the junction with the main drain.

Openings into the drainage tunnel in each basin are spaced 50 ft. apart along the center line. Weep holes through the walls provide relief for back pressure. Seepage and drainage into the basins, while they are unwatered, are carried in ducts below the floor, 20 ft. on centers, discharging into the drain tunnel on the center line. Sump pumps in the pump house take care of the seepage independently of the main pumping equipment used for unwatering.

Construction operations

Work on the yard started early this year with excavation of some 2,000,000 cu.yd., mostly rock which required blasting. The basins are in basalt rock whence most of the excavated material, hauled away from power shovels by dump trucks, went into a cofferdam extending around the outer end of the basins. By trucking through the outer or open end of

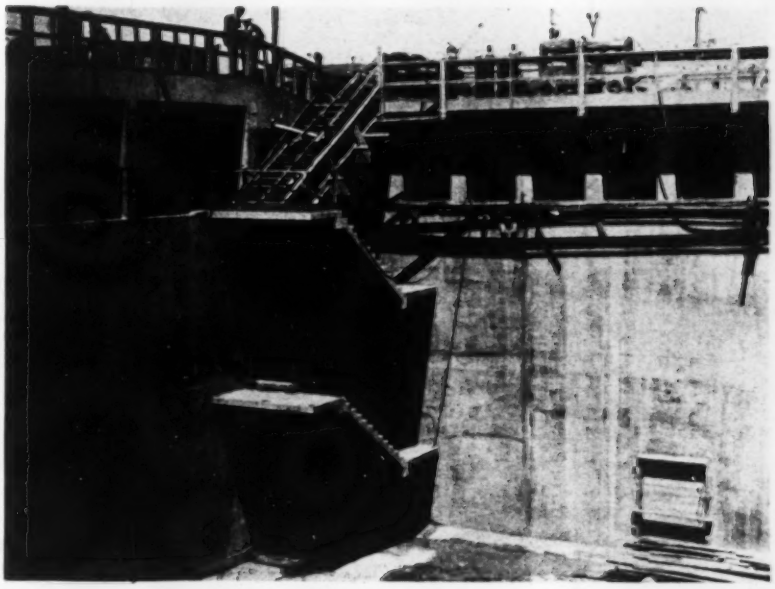
the basins and, in the later stages of the work, using roadways leading up on the cofferdam, it was possible to use trucks even for the final clean-up of excavated material in each basin.

Excavation was finished at the inshore end of the basins first and forms immediately were placed for pouring the 18-in. reinforced-concrete side walls. Because of the urge for speed it was decided to set up these forms for a 125-ft. wall length to be poured continuously and without contraction joints. Forms consisted of 14x16-ft. panels made up with vertical studs (2x6s) on 1-ft. centers and 4x8-in. horizontal purlins on 2-ft. centers. These panels were braced against the rock on the side next to the excavation and were held in place on the basin side by vertical timber frames set on 8-ft. centers. The timbers in these frames were 12x12s braced by struts of the same size, resting against the uprights at the quarter points. Three braces were used, running down to the horizontal leg of each frame, which extended entirely across the basin floor.

These wall forms were moved ahead, after the completion of each section, by unbolting the members and shifting them outward along the basin, unit by unit, to the new position. The frames were set up first and to them were bolted the 4x8-in. purlins. The concrete panels, meantime having been cleaned and reoiled after the preceding setting, were put in place. After each set-up adjoining timber frames were tied together by three horizontal runs of 2x12-in. planks fastened to the uppermost diagonal brace to give the assembly stability.

The timber frames, with a total height of 30 ft., brought the side walls up to the level of the gallery floor, which was poured as a concrete pavement after the walls had set. On this floor timber forms were set up for 18x18-in. concrete columns to support the deck slab at craneway level. After the columns had set, the deck slab and the longitudinal beams between columns (18 in. deep and 14 in. wide) were poured as a monolith. The craneway slab is divided into three bays by four rows of columns. These are on 6-ft. centers along the basin walls and on 12-ft. centers in the two inner rows.

The portion of the gallery across the inshore end of the basins is 20 ft. wide. The surface of the craneway slab slopes from a ridge along its center line to both sides. The slope is about 6 in. in the 17-ft. half-width.



Concrete stairways are cantilevered from basin walls. Gallery continues (left) along the inshore end of the basins.

Paving on craneway, gallery and basin floor is 8 in. thick, reinforced. The deck slabs in the gallery and also those at craneway level, both of which are 34 ft. wide, were put in with construction joints as much as 200 ft. apart. In the walls, the joints were made with keys and the keyways were painted with mastic before pouring the adjoining concrete.

Concrete for the superstructure was mixed on its way to the job in 4-cu. yd. truck-mounted mixers. The basin walls and part of the superstructure were poured by gravity delivery from these trucks, driven out on the space between the basins. For the superstructure and the outer ends of the side walls the concrete trucks discharged into 1-cu.yd. buckets at basin floor level. The buckets were then handled by truck-mounted cranes to place the concrete where desired in the structure.

When the wall forms were removed, the basin floor was poured, much like a heavy paving job, on a layer of crushed rock. With the bottom were also poured the concrete blocks on center line to support keel and ship bottom at a workable height.

The first keel was laid in one of the basins 118 days after breaking ground. At that time excavation in the adjoining basin had not been completed and concrete construction was still unfinished in the other four basins. Space is available on the west end of the basins for additional development if it later becomes desirable to add to present facilities.

Although the basins have a depth of only 22½ ft. over the sill at high tide, the design was made with a view to deepening some or all of the basins if emergency need should arise for deeper graving dock facilities.

For example, plans have been made for a cofferdam consisting of curved I-beams to be set around any gate at the outer end of the basin (placed horizontally like needle beams) so that the gate area could be unwatered and a new sill at lower level put in. At the same time the basin floor would be removed and the excavation deepened without disturbing the walls. The walls extend below the floor and the solid rock foundation would permit of deeper excavation.

It is estimated that each basin could be deepened in a period of about three weeks. However, it is expected that when needed as drydocks, by far the larger use for the basins would be for vessels with drafts of less than 22 ft.

The C-4s are being built for the Maritime Commission under a contract held by the Kaiser Company, Inc., Henry J. Kaiser, president, and Clay P. Bedford, general manager. L. H. Nishkian, consulting engineer, San Francisco, prepared the design for the basins.

Sand Fill Reduces Weight of Bridge Pier

***Contents in Brief**—The dead weight of one of the piers for the new Mississippi River Bridge at Dubuque, Iowa, was reduced 1,120 tons by making the central portion of the base a sand fill. A reduction in cost also was achieved because of the large amount of concrete eliminated. The pier was built by sinking a wooden crib within which a 9-ft. thick vertical concrete wall was placed by tremie to confine the sand fill.*

A SAND FILL, enclosed on all four sides by a tremie-placed concrete wall, has been used to reduce the weight and amount of concrete necessary for one of the main piers for a new highway bridge over the Mississippi River at Dubuque, Iowa. The foundation, designated Pier 18, is founded on good sand and gravel at a depth of 25 ft. below the river bed and 57 ft. below water level. The pier is supported on 336 wood piles averaging 95 ft. in length below the cutoff level, which is 23.5 ft. below the pool elevation of the river.

In all, 42 piers were required for the bridge, and of this number eight were in the river. Pier 18 is one of this group and is at the west end of the 845-ft. central span of the three-span truss unit that forms the main river crossing. It is located about 150 ft. from shore where strong currents are encountered and where excavation was necessary to a much greater depth than for the other foundations for the bridge.

The problem at this particular foundation was to keep the weight to a minimum and yet provide a foundation of sufficient depth to prevent scour under the most severe conditions. The design decided upon called for a central sand core 25 ft. deep, enclosed on the four sides by a 9-ft. wall of tremie concrete and on the top by a 7-ft. layer of tremie concrete. A 12-ft. thickness of concrete, placed in the dry, completed the base above which the pier shaft rises to a height of 70 ft. Such an arrangement made possible the elimination of 1,384 cu.yd. of concrete, when compared to a pier of solid concrete, and resulted in a 1,120-ton reduction in weight, making the weight of the completed pier 15,700 tons. Cost of the foundation also was less, since the sand fill cost only $3.50 per cu.yd.

The foundation was constructed within a wood crib, 43x75½ ft. inside and about 65 ft. high. Construction of this crib was somewhat unusual in that ring connectors were used to join the horizontal 12x12-in. timber struts to the 12-in., 53-lb. steel H-section bearing piles at the outside walls (Fig. 2). The box timbers for the exterior walls were 12x12 in. for the lower 36 ft., then 12x14 in. for the next 6 ft., 12x12 in. for the next 15 ft. and 10x12 in. for the remaining 8 ft. For the top 35 ft., or from the top of the tremie seal upward, oakum calking was added on the outside. The timbers were connected by ¾-in. dia. drift bolts 34 in. long, each bolt passing through three timbers. In the lower 25 ft. of the crib an inner form

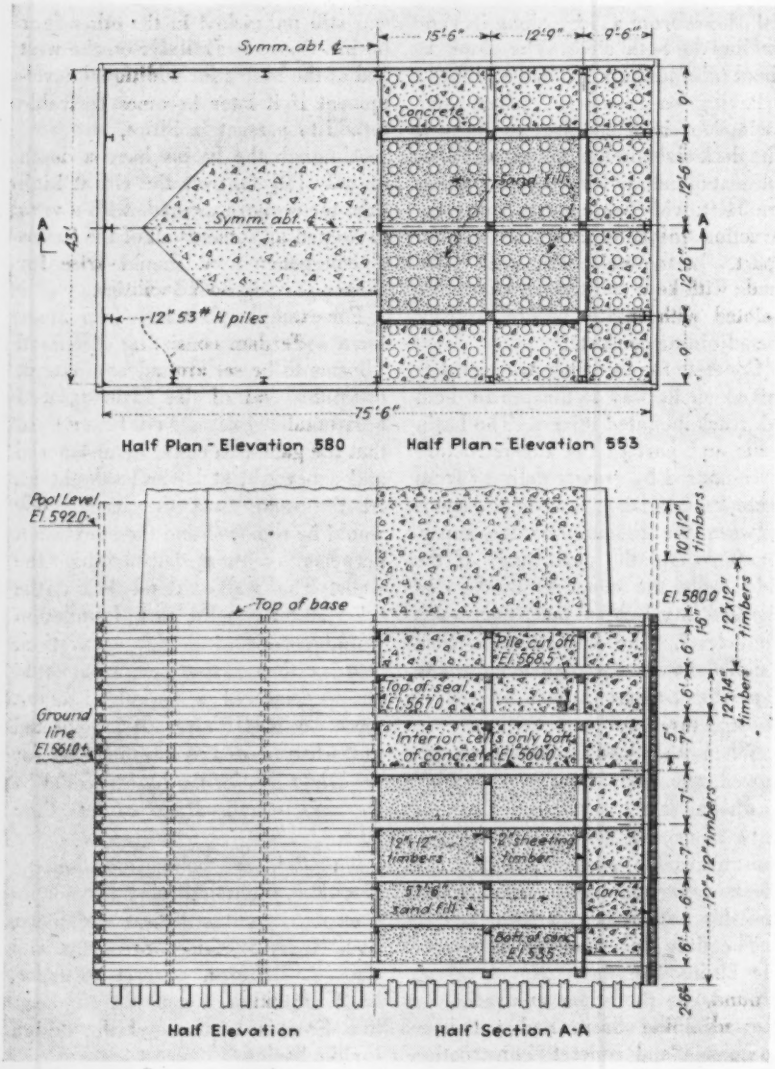
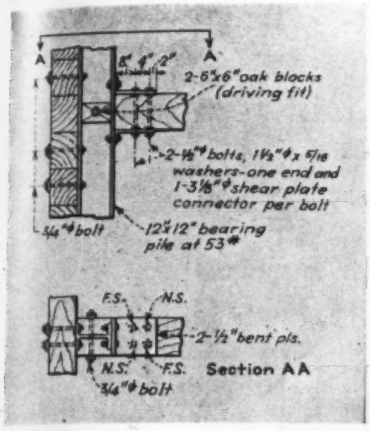


Fig. 1. By using sand instead of concrete for the inner base of this pier a 1,384-cu.yd. saving of concrete resulted and the pier's dead weight was reduced 1,120 tons. The outer wall of the crib was salvaged above El. 580 or to a depth of 12 ft. below normal pool level.

Fig. 2. **Where the 12x12-in. timber struts of the wood crib join the steel bearing piles at the outside walls, ring connectors were used to provide a sturdy connection. One ring connector per bolt was employed.**



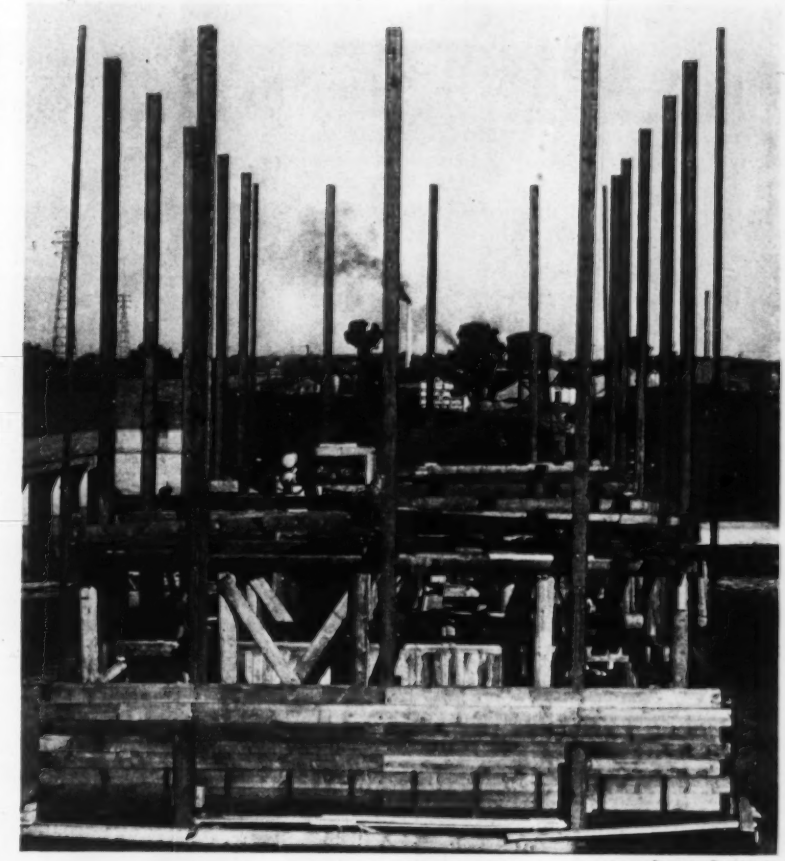
of 2-in. wood planking was placed 9 ft. inside of the outer wall. The entire crib required 360,000 b. ft. of Douglas Fir timber of which about 10,000 b.ft. were required for the inner form.

The crib was built inside ten 18-in., 105-lb. steel guide piles about 80 ft. long. During construction it was supported by hand winches from 35 temporary wood piles 80 ft. long that had been driven 30 ft. into the river bed and cut off at an even level to provide a working platform. The crib was buoyant until about 13 ft. high but was not released until the height had been built up to 20 ft. It sunk into the river mud sufficiently to remain firmly fixed when it was 49 ft. high.

After the crib had been constructed to its full height of 65 ft., it was sunk to final level by loading with 1,100 tons of pre-cast concrete blocks (four tons per lin. ft. of cutting edge) and excavating on the inside along the exterior walls. The excavation on the inside was 4 ft. lower than the walls of the crib when the bottom of the walls reached plan elevation.

Piles driven under water

With the crib in its final position, the necessary excavation over the enclosed area was carried out and the 336 wood piles were driven with the aid of high-pressure air-and-water jets until their tops were about 25 ft. under water, thus completing the preliminary work incident to the pier base construction. This jetting and driving action filled the interior of the crib with sand up to about 2 ft. above



Photos: By Hruska

Fig. 3. First section of crib being lowered into position. The steel exterior piles were to guide the crib into position, and the interior wooden piles, which number 35, were temporary and were used to support the crib until it was ready for floating. Note winch arrangement and wooden interior wall.

Fig. 4. Once the wood crib was completed it was sunk into position by the addition of a 1,100-ton load of pre-cast concrete blocks and by dredging on the inside along the exterior walls of the crib.

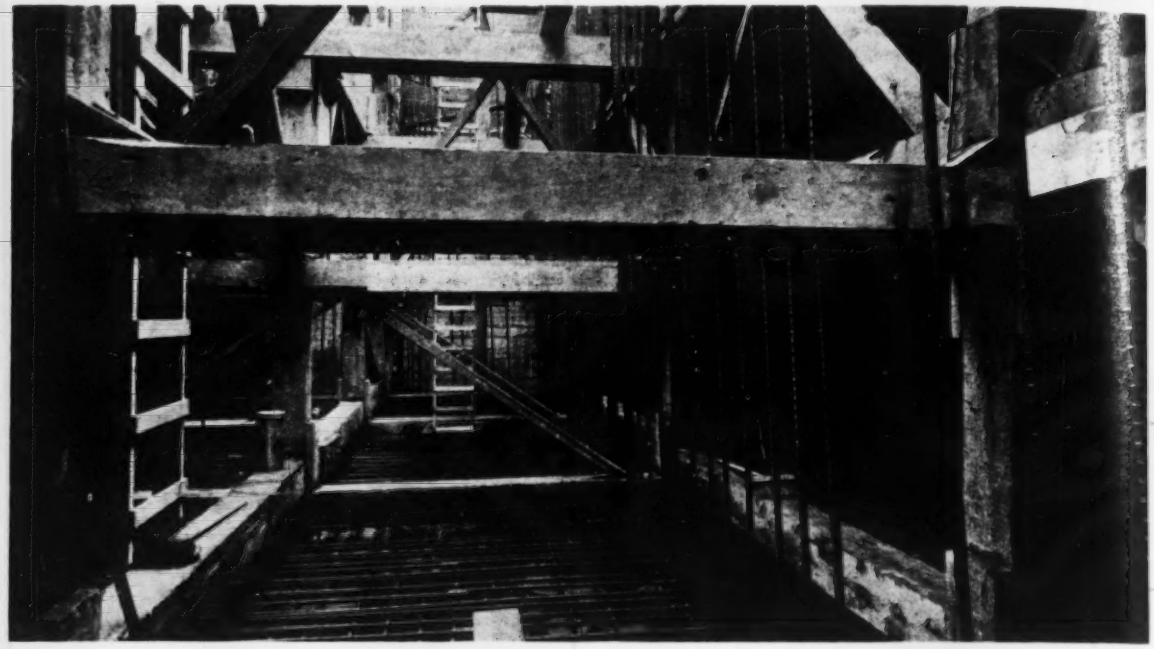


Fig. 5. Concrete has been carried up to the top of the inner wall of the crib and a 7-ft. seal added over the entire closed area. The wood struts will remain in place up to El. 580, which is 12 ft. below normal pool level.

plan grade. Thus, it was necessary to pump some material to get back to plan elevation in the exterior part of the crib.

First concreting operation was to fill the area between the inner and outer crib walls with tremie concrete, at the same time adding sand fill for the inner core so as to balance the pressure from the concrete. When both the concrete and the sand fill had been carried to the top of the interior wall, a 7-ft. concrete tremie seal was placed over the entire pier base and the crib pumped out. During this operation very little leakage occurred, although 30 ft. of water surrounded the crib above the seal. Final operation was to cut off the piles and pour the remainder of the pier in the dry.

The bridge is being built by the City of Dubuque Bridge Commission. Total cost of the new bridge is expected to be about $3,500,000 and it will provide a 24-ft. roadway for carrying U. S. Highway 20 traffic across the river at that point. Overall length of the structure is 5,759 ft. and the three-span, continuous-truss main river crossing consists of a 845-ft. combination tied-arch and cantilever central span and 347-ft. side spans. Both approaches are to be of plate girder construction, the Iowa or west approach to be 1,450 ft. in length and the Illinois approach 2,770 ft.

Howard, Needles, Tammen & Bergendoff, Kansas City, with Ivan P. Hanson, resident engineer, are the consulting engineers. Ferd J. Robers Construction Co., Burlington, Wis., and La Cross Dredging Corp., Minneapolis, Minn., for whom P. C. Peterson is superintendent, are the foundation contractors.

Reinforcing Bar Standards Reduced

REVISION of the simplified list of cross-sectional areas for steel reinforcing bars has been announced by the Division of Simplified Practice of the National Bureau of Standards as a war measure.

The first edition of Simplified Practice Recommendation R-26-24, approved by the industry in 1924, established eleven cross-sectional areas, the purpose being to retain as many as possible of the advantages that had accrued to the industry as a result of simplification during World War I, under the guidance of the conservation division of the War Industries Board. The 1924 list reduced the prevailing variety of sizes from 32 to 11, an elimination of more than 65 percent.

A revision of this recommendation in 1930 left undisturbed the listing of eleven cross-sectional areas, but expressed those areas in hundredths, instead of thousandths of a square inch. This was done to further simplify the work of engineering design where reinforced concrete is used. Engineering handbooks, reference tables, wall charts, and other texts immediately recognized this change in the listing of the sizes.

The industry, therefore, was well prepared at the advent of the present war to effect a further reduction in variety, if such action would further conserve materials, rolling mill equipment and manpower for the war program. In consequence, R26-30 was revised in May, 1942, to dispense with the use of the ½-in. square bar for the duration of the war.

In addition to the simplified schedule itself, the new publication, R26-42, Steel Reinforcing Bars, will include a brief history of the development of the project. Until the printed issue is available, free mimeographed copies of this revised Simplified Practice Recommendation may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C. The printed issue will be available soon from the Superintendent of Documents, Washington, D. C., for 5¢.

Three-Lead Driver Speeds Pier Work

SPEED OF CONSTRUCTION on a concrete pier in the Pacific Northwest was materially increased by putting down the reinforced-concrete piles with a triple-lead driving rig, assembled on the job. This type of driver was feasible because of the uniform spacing of the piles, of which some 2,000 were required, throughout the length of the pier. Much time was saved by using the three leads instead of the usual single-lead rig because it thus was necessary to move the barge and spot the exact location only one-third as often. With this advantage as many as 45 reinforced-concrete piles (lengths ranged from 66 to 83 ft.) were put down in two eight-hour shifts. The time spent in driving, including moving and spotting the barge, is believed to have been decreased almost 50 percent by the triple-lead plan.

The rig that was fitted up for the driving was a derrick barge 120 ft. long and of 32 ft. beam. It had two spuds at the stern, which aided in holding it steadily in position. The driving leads, about 40 ft. long, were mounted so they projected over the forward end of the barge. The horizontal timbers running back over the deck of the barge from the base of the leads were firmly bolted to the barge timbers.

The leads were spaced 8 ft. 4 in. on centers and were built up without the usual supporting frame; they were spaced and held together by horizontal ledgers, of which there were three. The inner faces of each lead near the top were cut away to provide a tapering entry that would guide the descending end of a pile into position in the leads.

Piles were brought from the casting yard by barge, about 20 per load. Up to 12 of these piles could be transferred to temporary storage on the side of the derrick barge, thus releasing the transfer barge sooner for another trip.

Piles were lifted by a three-point pickup and without the use of a spreader. This was done with the two-drum engine on the derrick by using the same boom for both lines. For handling the piles in a vertical position, as when they were lowered into the leads, the line that was divided to reach two of the three pickup points was slacked away and, when the pile hung almost vertically, its weight was carried by the choker that was originally the single pickup point; a second choker was put on with the lift on the opposite side, thus balancing the pull for the final, vertical lift.

Jetting aided driving

All the piles were octagonal in shape, either 18 or 20 in. in diameter. All were provided with a central, 3-in. down-spout for jetting. Conditions for jetting were almost ideal and the jets plus the weight of the piles carried them down through mud and sand to within about 3 ft. of the desired depth. This additional depth was then obtained by driving with an eight-ton (Vulcan No. 0) hammer.

When a pile had been driven to place, a further time saving was effected by putting a chock under it in the leads and allowing the hammer to rest right there until it was again needed, thus freeing the hammer line for other uses.

At the outer and more exposed end of the pier the driving was done with the stern of the barge in the direction from which the waves came. With the spuds on the bottom the work could thus go on in rougher weather than otherwise would have been possible. Later, after reaching a more sheltered position, the rig was turned around.

Construction of the pier was under contract to the General Construction Co., Seattle, Wash., J. A. McEachern, president; R. W. Jones, general superintendent. The contract was let by the U. S. Engineer Department under the general supervision of Col. Peter P. Goerz; Major H. L. Morian was area engineer in charge.

A concrete pile is being placed by the derrick in one of the three driving leads mounted on the forward end of the barge.

Charts Solve Multiple-Reservoir Problem

Capt. Joseph A. Novoro
U. S. Engineer Corps
San Juan, Puerto Rico

***Contents in Brief**—Determination of the individual flows from three or more reservoirs used for a multiple-storage water supply may be obtained graphically by preparing a set of charts showing the relationship between the friction loads in the various parts of the system. Outlined are the steps to be followed in preparing such charts, and the work necessary to determine the individual flows when the combined discharge is known.*

ANALYZING THE FLOWS from multiple reservoirs, which is often a difficult problem, can be done graphically with ease by a set of Hazen and Williams tables or charts giving friction losses. Use of the Hardy Cross method for analyzing the flow from multiple reservoirs was explained in *Engineering News-Record* March 12, 1942, p. 408, by J. F. Muir, associate professor of civil engineering at the University of British Columbia. To determine graphically all the individual discharges for a given total flow involves a little more work than with Professor Muir's solution, but once the required charts are prepared it is possible to study the effects of several different total discharges with very little effort.

The three-reservoir problem solved by Professor Muir, using the Hardy Cross method, is shown in Fig. 1, while Figs. 2 and 3 illustrate the drafting work necessary to obtain the solution graphically. In constructing Fig. 2, the line B-3 is drawn to show the hydraulic gradient at B for various flows through the 4,000 ft. of 10-in. dia. pipe joining Reservoir 3 and B, while the line B-2 gives the same information for flows between B and Reservoir 2. This latter graph is continued to the left and above El. 150 to show the gradient required at B to reverse various flows into Reservior 2. (It is to be noted that an output of less than 1,645 gpm. from Reservoir 3 will cause a reverse flow into Reservoir 2.)

By combining horizontally Graphs B-2 and B-3, as for parallel pipelines, line B-2-3 in Fig. 2 is obtained. This combined graph will give the flow past B to A, and the hydraulic grade at B. Once the grade for any discharge past point B is determined, the component flows from Reservoirs 2 and 3 can be read from Graphs B-2 and B-3.

For example, using a 479-gpm. flow from B to A, it is apparent from the graphs (Fig. 2) that the gradient at point B is El. 175.4 and that Reservoir 3 supplies 1,402 gpm., while 923 gpm. flows into Reservoir 2. Flows at A requiring more than 1,645 gpm. to be furnished from B will make necessary flows from both Reservoirs 2 and 3. As an illustration, a 2,880-gpm. demand from B will create a hydraulic gradient at B of El. 120 and Reservoir 2 will supply 1,000 gpm. and the 1,880-gpm. balance will be obtained from Reservoir 3.

It is interesting to note that with a 1,225 gpm. flow from Reservoir 3 the entire quantity goes into Reservoir 2. Any flow from Reservoir 3 of less than this amount will result in water being supplied to Reservoir 2 from both the other reservoirs.

The second chart necessary to complete the analysis of the three-reservoir problem is illustrated by Fig. 3 where Graph B-2-3 is reproduced from Fig. 2. The friction loss for 500 ft. of 10-in. dia. pipe is shown in Fig. 3 as Graph A-B, which may be drawn at any convenient place on the sheet. This line is then combined vertically with Graph B-2-3, as for pipes in series, to produce the line A-B-2-3. This new line will give the hydraulic gradient at A for various flows arriving at A from B.

For example, with 479-gpm. flow from B to A, the resulting hydraulic grade at A is 173.6. By drawing a vertical line from this point on Graph A-B-2-3 to an intersection on Graph B-2-3, the hydraulic grade at B can be determined. Using this value in Fig. 2, the component flows from or into Reservoirs 2 and 3 are determined.

The hydraulic grade at A for various flows from Reservoir 1 to A is given by Graph A-1 in Fig. 3. At zero flow from B to A we find on Graph A-B-2-3 (Fig. 3) that the hydraulic grade at A (also B) is El. 192.4. From Fig. 2 we see that a flow of 1,225 gpm. flows from Reservoir 3 into Reservoir 2 and that there is no flow between A and B. Under these conditions 3,240 gpm. (from graph A-1, Fig. 3) will flow from A and it will all be supplied by Reservoir 1. By combining Graphs A-1 and A-B-2-3 horizontally, as for parallel pipes, we obtain curve A-B-1-2-3 of Fig. 3. This will give hydraulic grade at A for any flow past A or vice versa.

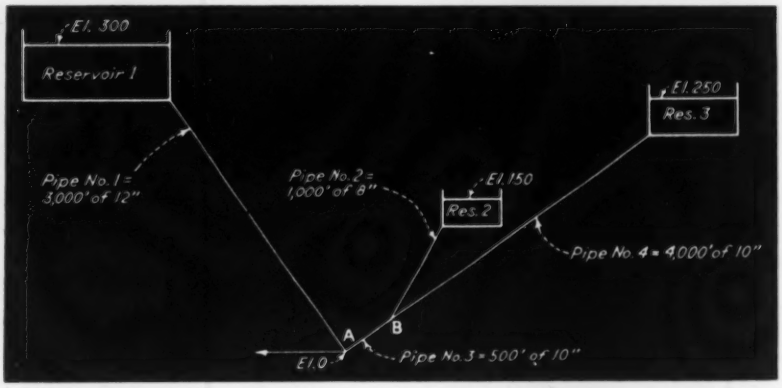


Fig. 1. Three-reservoir problem for which a graphical solution is developed.

We now have all the tools necessary to study the three-reservoir problem for a specified flow of 4,000 gpm. at A, which was the total flow analyzed by Professor Muir. Any other flow can also be investigated with very little extra work. The procedure in using the charts is as follows:

From Graph A-B-1-2-3, in Fig. 3, for a 4,000-gpm. flow, the hydraulic grade at A is El. 173.5, which checks with Professor Muir's figures very well as he also determined the grade as El. 173.5 (300.0 minus 126.5). Of this flow, 479 gpm. comes from B to A (graph B-2-3, Fig. 3) and 3,521 gpm. from Reservoir 1. Using a flow of 479 gpm. and entering Graph B-2-3, Fig. 2, we find the hydraulic grade at point B is at El. 175.4. At this grade we also find one line B-3 that the discharge from Reservoir 3 is 1,402 gpm. and on graph B-2 the flow into Reservoir 2 is 923 gpm. This leaves a net 479-gpm. flow from B to A.

Another problem is to determine what discharge at A results in no flow into or out of Reservoir 2. From Graph B-3, Fig. 2 at El. 150 read 1,645 gpm. This discharge goes from B to A. Using this output in Graph A-B-2-3, Fig. 3, the hydraulic grade at A is El. 137.0. Drawing a line horizontally from this point, the flow from Reservoir 1 is 4,025 gpm. on Graph A-1 and the total discharge from A is to be found 5,670 gpm. on Graph A-B-1-2-3.

An interesting case is that in which only part of the Reservoir 1 output is supplied to the distribution system at A and the balance goes into Reservoir 2. This will occur when the demand at A is less than 3,240 gpm., as illustrated by Fig. 3. For example, assume a demand at A of 2,500 gpm. Then, the hydraulic gradient at A is at El. 210, as shown by line A-B-1-2-3 of Fig. 3. Projecting a line horizontally on that chart at El. 210, read from line A-1 a flow of 2,930 gpm. from Reservoir 1 and 430 gpm. reverse flow from A to B, as shown by line A-B-2-3. Drawing a line vertically from this last point to Graph B-2-3, Fig. 3, determines the hydraulic gradient at B. It also is possible to enter Graph B-2-3 in Fig. 2 directly with a 430-gpm. reversed flow and drawing a line horizontally at this hydraulic gradient read from line B-3 a 1,005-gpm. discharge from Reservoir 3 and from Graph B-2, a 1,435-gpm. flow into Reservoir 2.

The charts developed are also useful when it is desired to determine the flows where the hydraulic gradients are limited by ground elevations, tunnels, and through hills, or by minimum pressure requirements, at say A. In such a case it is merely necessary to go into the charts at the hydraulic gradient desired to determine flows.

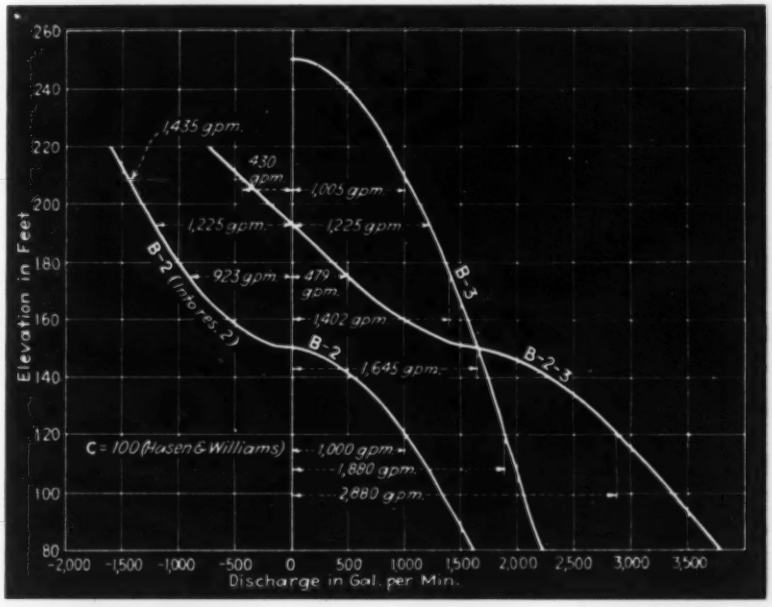


Fig. 2. Graphical relationship between the hydraulic gradient and the different discharges for the various parts of the three-reservoir system illustrated in Fig. 1. Line B-3 shows the hydraulic gradient at B for varied flows through the 4,000 ft. of 10-in. pipe joining point B, and Reservoir 3, while B-2 gives similar information for flows between B and Reservoir 2. Line B-2-3 is drawn by combining Graphs B-2 and B-3 as for parallel pipelines.

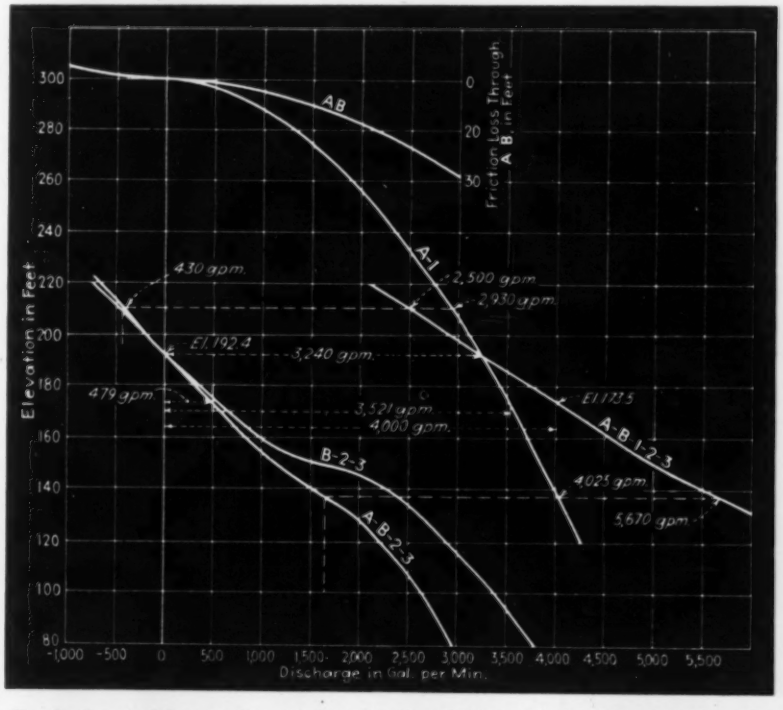


Fig. 3. Graph B-2-3 on this chart is the line B-2-3 in Fig. 2. Line A-B gives the friction loss for 500 ft. of 10-in. pipe. By combining Graphs B-2-3 and A-B vertically, as for pipelines in series, line A-B-2-3 is produced. In the same way combining horizontally lines A-1 and A-B-2-3, as for parallel pipes, line A-B-1-2-3 is found.

Fig. 1. Carefully planned forms enable 100 carpenters to prepare 25,000 sq.ft. of slab daily on Ft. Greene Houses, rushed to completion for war housing.

Planned Formwork Speeds Construction

***Contents in Brief**—Complete plans for forms and their erection and careful attention to details enable 100 carpenters to prepare column and deck forms for an average of 25,000 sq. ft. of concrete slab daily on a multi-story housing project in a war busy section of New York. Plywood is used for all forms with each piece detailed for a particular location. Long boom cranes with gooseneck jibs place concrete to the roof over the thirteenth floor without use of runways and buggies.*

SUBSTITUTING PLANNING in the office for less work and confusion in the field, the contractors for the concrete frame of the Fort Greene Houses have cut carpenter work to a minimum and speeded the construction of a much-needed war housing project in New York. This development, 3,501 living units in four thirteen-story, four eleven-story and twenty-seven six-story buildings, is one of the largest apartment-type war housing projects yet undertaken. The first occupants moved into the project Aug. 17.

The buildings have 2,800,000 sq.ft. of floor area in the 35 apartment buildings and three one-story store buildings. A reinforced-concrete skeleton is used for each of the buildings to reduce the amount of steel necessary for construction. The structures have brick exterior walls but use a complete concrete frame to avoid waiting on construction of bearing walls as the building rises. Concrete columns, ceilings and floors are to be painted and left permanently exposed in the structure.

Construction of the buildings is complicated by a design that requires as many as nine changes in column sizes in a vertical row of columns in the thirteen-story buildings. Not content with making the builder's life hard with changes in one dimension, the designer varied these columns in both dimensions. Formwork, therefore, had to be carefully planned in order to get economical reuse of the materials.

Detailed erection drawings

Well in advance of any carpenter work in the field the form plans for the project were made to get the greatest use with the least handling from every piece of lumber coming to the job. The wood forms are detailed for fabrication almost as completely as steel forms would be with an erection drawing supplied to show exactly where and how each piece is to be used on each floor.

Basic material for form construction is the standard 4x8-ft. sheets of concrete-form grade plywood. Column forms are made of $\frac{3}{4}$-in. material, which is used without backing of any kind. Five steel clamps are used in the $7\frac{1}{2}$-ft. column height from floor level to the bottom of the next beam.

The generally available, adjustable, wedge-tightened clamps are used for columns more than 16 in. on a side, but for the smaller columns a special clamp is used. The latter are in two halves, each consisting of three iron bars with the center one riveted at a permanently square right angle to the other two; when the two halves of the clamp are put together, the single bar of one slips between the double bars of the other and is held at the proper size by a cut-nail put through a hole arranged for each column size.

Slab forms are $\frac{5}{8}$-in. thick plywood supported on 2x4$\frac{3}{4}$-in. spruce ribs,

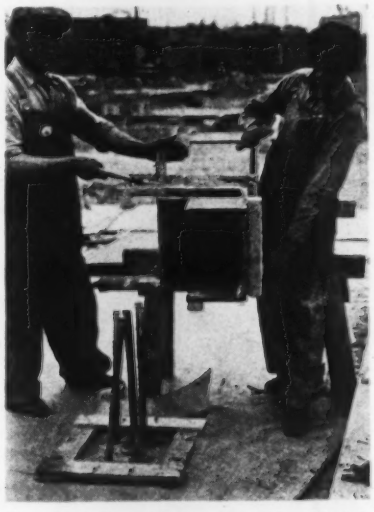


Fig. 2. Column forms are assembled in horizontal position, then set in the framed guide seen in the foreground.

surfaced on the two edges only, and spaced 16 in. c. to c. Vertical shores, at not greater than 3-ft. intervals, are used to support the beam bottoms and, where necessary, additional shores are used under the ribs at the center of a bay.

A complete assembly plan for the column forms for all floors and for the several similar buildings is combined on one drawing, part of which is shown in Fig. 4. Another drawing has the information on the slab forms with each piece of plywood, other than the full 4x8-ft. sheets, designated for a particular location.

Forms manually handled

Forms are designed to be handed up manually from one floor to the next. Column forms come apart into four flat pieces; the beam sides and bottoms are separate; and the slab decking is only tacked to the ribs. Light-weight spruce is used for all joists and backing and the pieces are handed up by swinging them through a circular arc around the outside of the floor slab to a point where a man on the floor above can reach one end. The larger plywood pieces are pushed up through the permanent elevator and stairway openings in the floor.

Despite a schedule calling for an average daily construction of about 25,000 sq.ft. of floor, the job employs only about 100 carpenters with two general and seven deputy carpenter foremen. Each gang does one job only, i.e., one group assemble and set column forms, another sets the beam bottoms and sides, and still another lays the slab forms. The men work in small crews so that the confusion of a large job is absent and the work is scattered so that only a few men are in one area at one time.

Long booms for concrete placing

Wings of the buildings are 26 to 32 ft. wide to give outside exposure to every room of this garden-type apartment structure. The plan adopted for the concreting takes advantage of this narrow design to place the concrete directly from bottom-dump buckets without the use of distributing runways and buggies. This requires long booms on the cranes and the use of gooseneck jibs for construction on the high floors.

One crane is equipped with a 120-ft. straight boom and a 20-ft. jib at about a 45-deg. angle to reach over the top of the roof above the thirteenth floor. Two long boom cranes placing concrete are shown in Fig. 6. The cranes, then equipped with only 110 ft. of boom, plus jib, were placing concrete for the twelfth floor.

Use of the gooseneck jib makes it possible to place concrete to the center of each wing by moving the crane from one location to another. Two cranes are normally used on one building, both working in the same area to complete one wing, then moving to successive sections across the structure.

Fig. 3. Slab forms are ⅝-in. plywood on 2x4¾-in. spruce ribs at 16-in. c. to c. Ribs and plywood are handled in separate pieces marked for planned position.

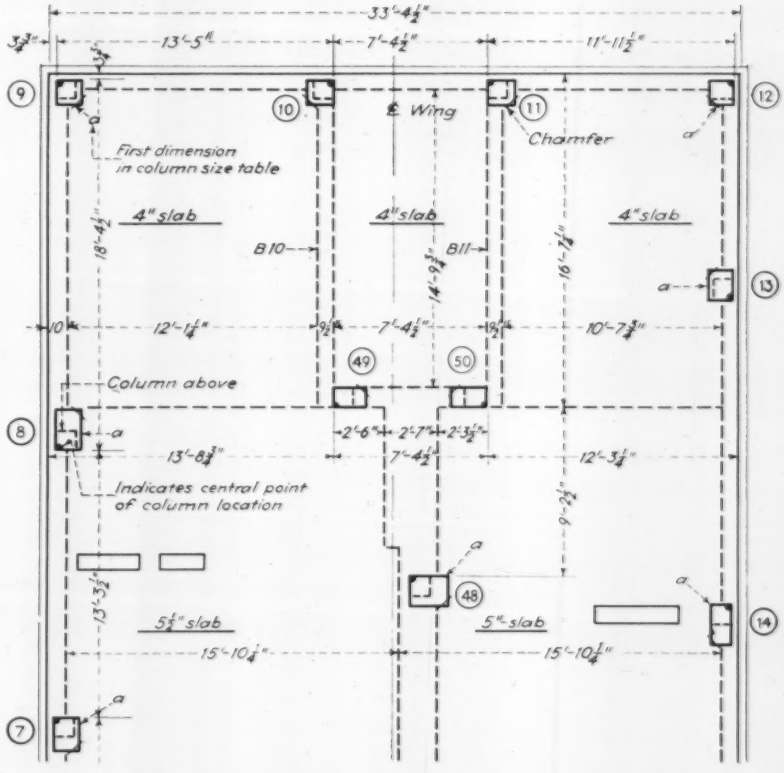


Fig. 4. Part of the contractor's form assembly plan for one type of building. Numbers refer to a table showing column size in which "a" is the first dimension given, "B" is beam reference and "L" is spandrel. Engineers lay out the floor to this plan and the carpenters use it for setting forms.

Concrete comes to the job in transit-mix trucks and is hauled directly to the location required. Placing starts with the filling of all the columns in the area within reach of the crane with 3,500 psi. controlled-strength concrete (3,000 psi. is used for columns in six-story or less buildings and for the top six stories of high buildings). Filling the columns first gives the concrete a little time to shrink, and avoids subsequent contraction cracks at the top of the columns. The floor-slab concrete, designed for 2,500 psi. concrete, is distributed directly from the concrete bucket and leveled by hand.

Single-line, bottom-dump buckets, specially selected to take the discharge from a truck mixer, are used. A 2-cu.yd. bucket, Fig. 6, designed to be laid down for loading, is used with moderate length booms. A special 1½-cu.yd. bucket with flared top has been found very satisfactory for use with the long boom cranes.

The method used here to place concrete has several advantages over the use of runways and buggies: A smaller crew is required for handling the concrete into place; less hoisting is done, as it is not necessary to reach to the top of a hopper above the deck where work is being done; concrete can be started when only one-third of a floor is completely ready since runways are not necessary over the work; the setting and moving of runways is eliminated, as well as the subsequent problem of storing or lowering the materials for them; less foreign material gets on the forms; and the concrete has less opportunity to segregate when handled only once from mixer to form. However, to gain these advantages a completely accessible site is required and the truck-mixers are held for a longer time.

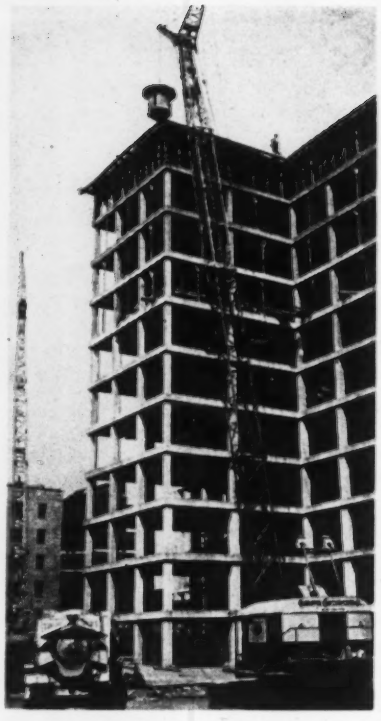


Fig. 5. Concrete is placed at high levels by two cranes using gooseneck jibs. No buggies or runways are used.

By the methods described, three floors, as much as 34,000 sq.ft. of slab and 770 cu.yd. of concrete, have been placed in one day with three cranes.

The concrete slab becomes the finished ceiling and floor of the apartments, except in the bath. Thus unusual care is necessary to provide a clean ceiling and a hard, dust-free floor. Pouring concrete directly with the crane helps considerably in keeping the slab form clean, as the placing crew is not working over the forms ahead of the concrete. A flexible-shaft gasoline-powered vibrator is used to consolidate the concrete in the columns and slab. The concrete is struck off with a hand screed followed by wood floats.

The huge housing project, to accommodate defense workers, is being built by the New York City Housing Authority under a loan contract with the U. S. Housing Authority. The entire cost of the project is estimated at about $12,000,000. John P. Riley is chief engineer for the N.Y.C. Housing Authority; Harry M. Prince is in direct charge of the construction; and Arthur Johnson has supervision of the project.

The general construction contract, amounting to $9,437,000, is held by the DMW Contracting Co. of Brooklyn for whom Alexander Steinfeld is project manager and E. J. Burns is superintendent of construction.

A sub-contract for the concrete work is being executed by Three Companies, Inc., which is made up of Knickerbocker Concrete Arch Construction Co., Inc., Corbetta Construction Co., Inc., and Willcox Construction Co., Inc., all of New York City. For Three Companies, Inc., C. H. Davidson is project manager, P. L. Moccia, superintendent, L. C. Finnegan, assistant superintendent, and R. L. Mellik, office engineer.

Fig. 6. Concrete is placed in columns first, then spread over entire floor area. Hand-screeds strike off the concrete.

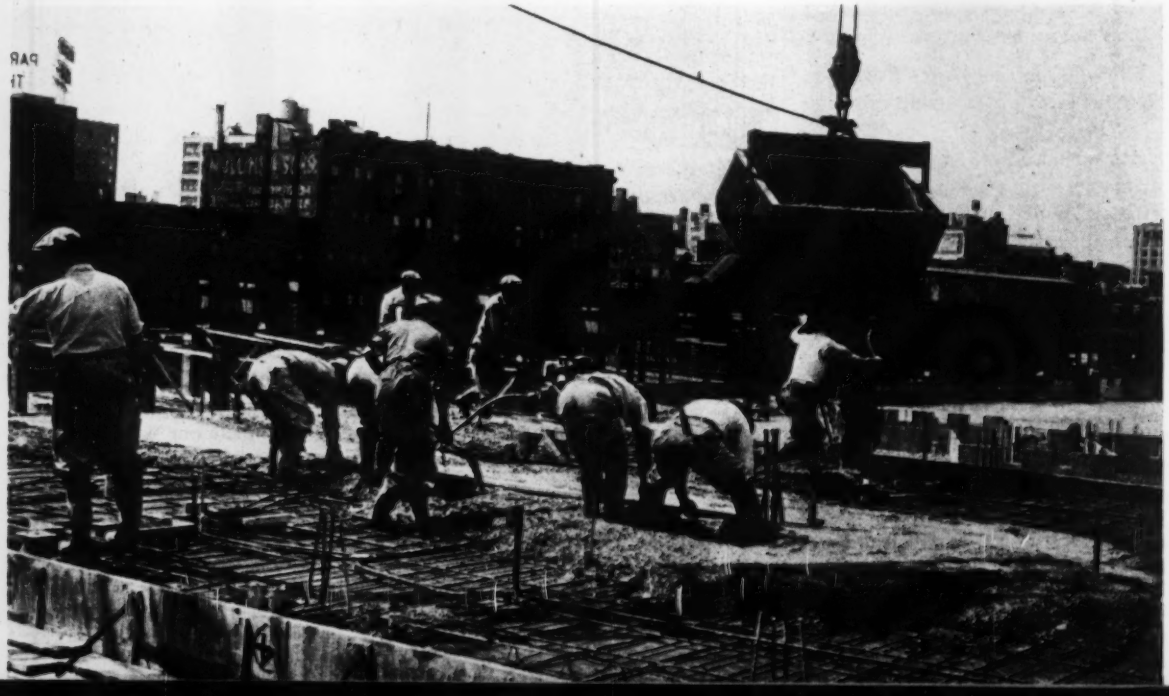


Fig. 1. Biggest through cut was this one, 40 ft. deep, but one sidehill cut reached 135 ft.

Heavy Rock Work Features Kentucky Road

Contents in Brief—*Construction of a 4.4-mile access road to the Wolf Creek Dam site on the Cumberland River has been one of the most difficult road jobs ever carried out in the state of Kentucky. Common excavation totaled 100,000 cu.yd. and rock work 400,000 cu.yd. The maximum sidehill cut was 135 ft., the deepest through cut 40 ft., and the highest fill over 300 ft. to toe on the low side. Over 2,000 tons of dynamite were required.*

To Provide Access to the Cumberland River where Wolf Creek Dam is under construction, the Nashville District, U.S. Engineer Department, is now completing a road that required what is probably more rock excavation per mile than any other two-lane highway ever built in Kentucky. Starting at the town of Desda, the road extends 4.4 miles through a very hilly area that required numerous deep cuts. One through cut was 46 ft. deep, and the road ends in a sidehill cut of 135 ft. maximum depth. The last 3,000 ft. of the highway called for removal of 160,000 cu.yd. of rock. The entire job included 100,000 cu.yd. of common and 400,000 cu.yd. of rock excavation.

Of 20-ft. width, the roadway has an 8-in. water-bound macadam base and a 1-in. bituminous surface. The maximum grade is 6 percent, the greatest horizontal curve 15 deg., and the minimum sight distance 500 ft., both horizontal and vertical. Because there are so many curves, the longest piece of tangent on the road is 800 ft., and some 14,000 ft. of guard rail was required. The width from shoulder to shoulder is 28 ft. To provide sufficient sight distance ten additional feet were excavated on the inside of most curves, and to reduce the danger from falling stone, the cuts often had to be widened both on the tangents and on the outside of the curves.

When Wolf Creek Dam is completed the highway will be extended across that structure and will be made a part of the Kentucky state highway system. An unimproved road ran near the south end of the new construction but the last two miles of the project were not accessible from existing roads or railroads. Thus, the contractor chose to start at the Desda end and work toward the damsite. At first, one 8-hr. shift was employed and then two 10-hr. shifts, but drilling operations for the blasting work continued 24 hours per day much of the time. The contractor's maximum crew was about 160 men.

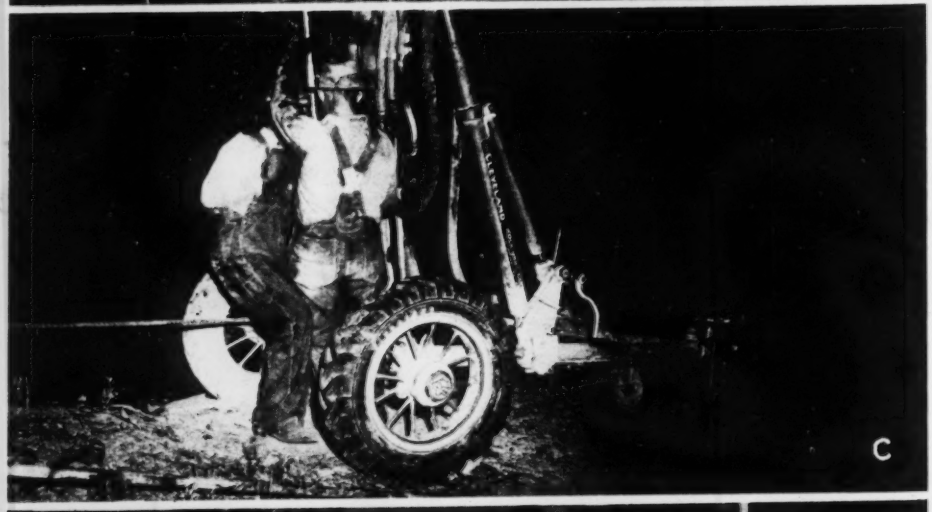
Major earth-moving equipment included: Two shovels of 1 to 2-cu.yd. capacity, two 18-yd. carrying scrapers, fourteen end-dump trucks of 8 to 12-cu.yd. capacity, three bulldozers, one patrol grader, five wagon drills, twenty jack hammers, several tractors, two small portable light plants, and five air compressors, including one of 500-cfm. capacity, two 315-cfm. and two of the 210-cfm. size.

Extensive dynamiting required

The rock, generally, was limestone. In making the cuts, the usual practice was to work not over three faces at a time and the major part of the excavated material was used for fill. Because of the small amount of common excavation as compared to rock, extensive blasting was necessary on all cuts.

In making a 40-ft. deep through cut, some 250 drillholes of between 30 and 40 ft. in depth were required, as illustrated in the accompanying photographs. Springing the bottom of the drillholes was necessary to provide room for the final charge and this was accomplished successfully by setting off from three to seven sticks of dynamite in the bottom of each before the final charge was added. In order to minimize the possibility of a premature blast from the heat retained by the stone due to the springing, a waiting period of 24 hours was required before the real charge could be loaded.

Consumption of dynamite averaged



about 1 lb. per cu.yd. of rock excavation, and in all over 2,000 tons were used. Two small portable light plants were employed for detonating the charges.

In placing the common excavation as fill, it was spread in 6-in. layers and compacted with sheepsfoot rollers. The rockfill was placed in layers not over 3 ft. deep, and all stone larger than ¼ cu.yd. was broken up. Compaction by the spreading and hauling equipment was considered sufficient for the stone fill. The rock in the bottom of completed cuts was covered with 1 ft. of earth as a subgrade for the roadway; 2 ft. of covering was used on the top of the fills. Rock outcroppings were so extensive that for the last 7,500 ft. of the road, no earth was found on the right-of-way so that large amounts had to be trucked in to cover the rock.

Traffic-bound temporary surface

Once the earthwork was complete, a traffic-bound surface consisting of about a 3-in. layer of crushed stone of 1½-in. maximum size was added. This surfacing permitted immediate use of the highway for transporting materials to the damsite. About one month later the final paving, which consisted of an 8-in. base and 1-in. bituminous mat wearing surface, was begun.

For the paving operation the contractors used twenty-six 1½-ton trucks, three 10-ton, 3-wheel smooth rollers, two 10-ft. wide spreader boxes, one patrol grader and two 1,000-gal. water trucks. Paving started at the Cumberland River and progressed toward Desda.

The 8-in. water-bound base was built in three layers. These consisted of a ¾-in. thick compacted first course of crushed stone of ½-in. maximum size, a 4-in. compacted middle course of 3-in. maximum size stone, and a 3¼-in. top layer of 3-in. maximum size. After each course was thoroughly rolled and keyed, screenings were applied uniformly over the

Fig. 2. Construction of the 40-ft. deep cut shown in Fig. 1 required several weeks of work. Overburden was removed (A), then 250 holes of 30 to 40-ft. depth were drilled (B), operations continuing 24 hours per day (C). After "springing" each hole with a preliminary charge of three to seven sticks of dynamite, final charge of five tons of 40 percent dynamite was added (D).

roadway by an end dump truck to fill all voids on the surface. Rolling continued during the placing of screenings, which were of ¾-in. maximum size and with 90 to 100 percent passing a ½-in. mesh screen.

The 1-in. thick bituminous mat wearing surface consisted of crushed stone bonded with an asphalt cutback. When the water-bound base course had dried, a tar prime, at 175 to 250 deg. F., was added at the rate of 0.40 to 0.45 gal. per sq.yd. Once the prime coat had been applied, coarse aggregate consisting of crushed stone of 1-in. maximum size was added at the rate of about 100 lb. per sq.yd. When this stone had been spread, 0.1 gal. of cutback MC-3 asphalt per 10 lb. of stone was applied by pressure distributors at 25 to 75 psi. pressure and at 150 to 255 deg. F. temperature. Mixing was by means of a patrol grader, and, when the stone was sufficiently covered with asphalt, the material was spread and rolled.

With the cover course rolled sufficiently to provide the required bond, the cutback asphalt was applied to the surface at the rate of 0.2 gal. per sq.yd. Then the seal aggregate, which was of ½-in. maximum size crushed stone, was added at the rate of about 25 lb. per sq.yd. Rolling followed at once to complete the pavement. The 4.4 miles of road was paved in about three months by employment of two 8-hr. shifts most of the time.

Who's who on the job

For the Nashville District, Col. O. E. Walsh is district engineer; Maj. R. D. Lustenberger, executive assistant; and V. M. Cone, principal engineer in charge of the engineering division. C. P. Carter was resident engineer at the start of the work, and Robert C. Johnson was resident engineer during the latter part of the construction. Codell Construction Co., Winchester, Ky., with J. Scott Talbott as superintendent, was the general contractor for the $460,000 job.

Fig. 3. Where road ends at damsite the cliff was so steep (E) that a 135-ft. deep sidehill cut was required (F). By hand excavation a shelf was first prepared on which the mechanical equipment could operate. By use of a snub cable, a bulldozer operated on the shelf and rolled the big stones over the edge of the fill (G). Where road starts down the cliff a 46-ft. deep through cut was required (H).

New Sampler for Soft and Sandy Soils

Henry D. Hammond
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New York City

Contents in Brief—An improved device for securing undisturbed samples of soft subsurface material uses an inverted orange peel of spring leaves to hold the sample. The tool will fit split-barrel sample spoons.

AFTER SEVERAL YEARS OF WORK a very satisfactory sampling spoon for soft and cohesionless soils has been developed by New York City's Department of Public Works. Positive mechanical action is assured with this device, which depends neither upon friction nor vacuum action for raising the soil to the surface, as do most older type samplers.

The equipment fits inside any of the split-barrel sample spoons already on the market and, although it looks complex, is of simple construction. It consists of a ring, slightly larger in opening than the spoon's shoe, to which are attached ten curved spring leaves, bent and tempered so as to form a dome when free. In the case of the 2-in. spoon, which is the size illustrated, the leaves are held open by a thin ring.

Soil pressure trips leaves

This ring is attached to two pull rods sliding in recesses in the walls of the spoon, and the rods are welded to a circular plate nearly closing the top of the barrel. As the soil sample rises in the spoon, it pushes the plate upward and pulls the ring free of the grip of the spring leaves. This action allows the leaves to close and shut off the bottom of the sample tube. In the case of soft clays, muds or non-cohesive sand, the tension of the leaves is sufficient to cut entirely through the material, and to close completely the bottom of the sample tube.

The sampler was built chiefly to reduce disturbance to the soil due to over-driving, often necessary with the older type tools. In securing cohesionless samples by any of the older methods, except freezing, often it happens that the material is so greatly compacted by over-driving that subsequent laboratory tests on the sample are very misleading. For a description of the freezing method mentioned see (*Engineering News-Record*, Aug. 13, 1942, p. 229.) Likewise, in the successive abortive attempts to raise a sample, the critical stratum is often cut entirely through. Frequently the material finally obtained represents a much harder stratum actually lying beneath the soil considered tested. Consequently, undisturbed samples of these soils have been obtained in the past only by the very expensive and slow work of freezing a plug at the bottom of the sampling tube.

The contrivance illustrated, especially when employed with equipment of small diameter, will not eliminate all distortion due to penetration. But the sampler should render unnecessary much of the disturbance with the more common sampling methods, since distortion due to overdriving, in order to secure a sample, is avoided. It is believed also that by careful experiment with various materials to determine the minimum penetration permissible to trip the spring device, a standard sampling procedure can be developed that would permit establishment of a fairly constant relation between the soil in place and the laboratory reactions of the sample. However, this procedure can hardly be said to have been established up to now, especially with softer materials.

Larger spoons planned

Plans are in hand for constructing larger spoons fitted with the device, in which cases the brass cylinder ordinarily used to seal the sample and convey it to the laboratory will

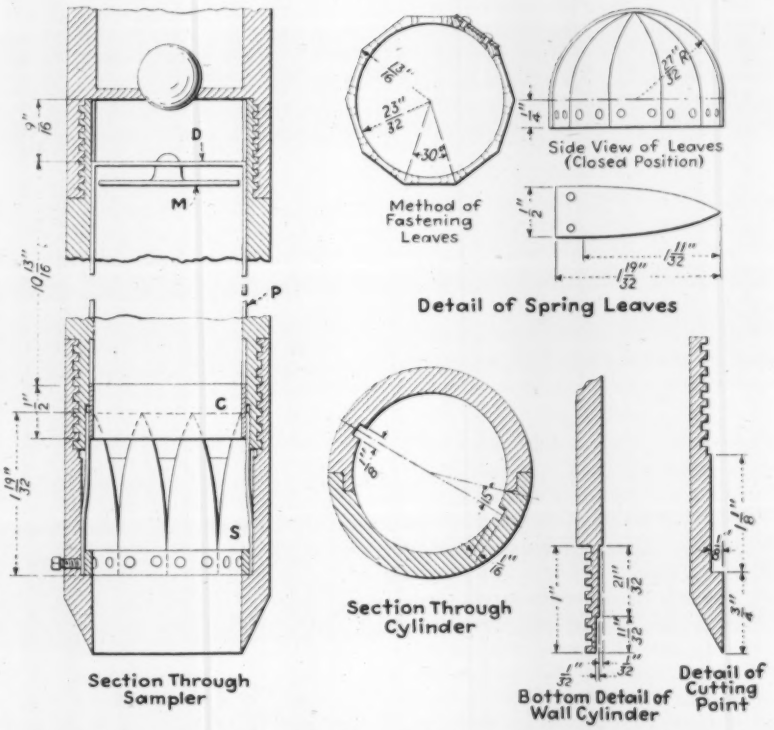

Fig. 1. Undisturbed samples of cohesionless soils are assured by this 2-in. sampler. Larger sizes could be built that would work just as well.

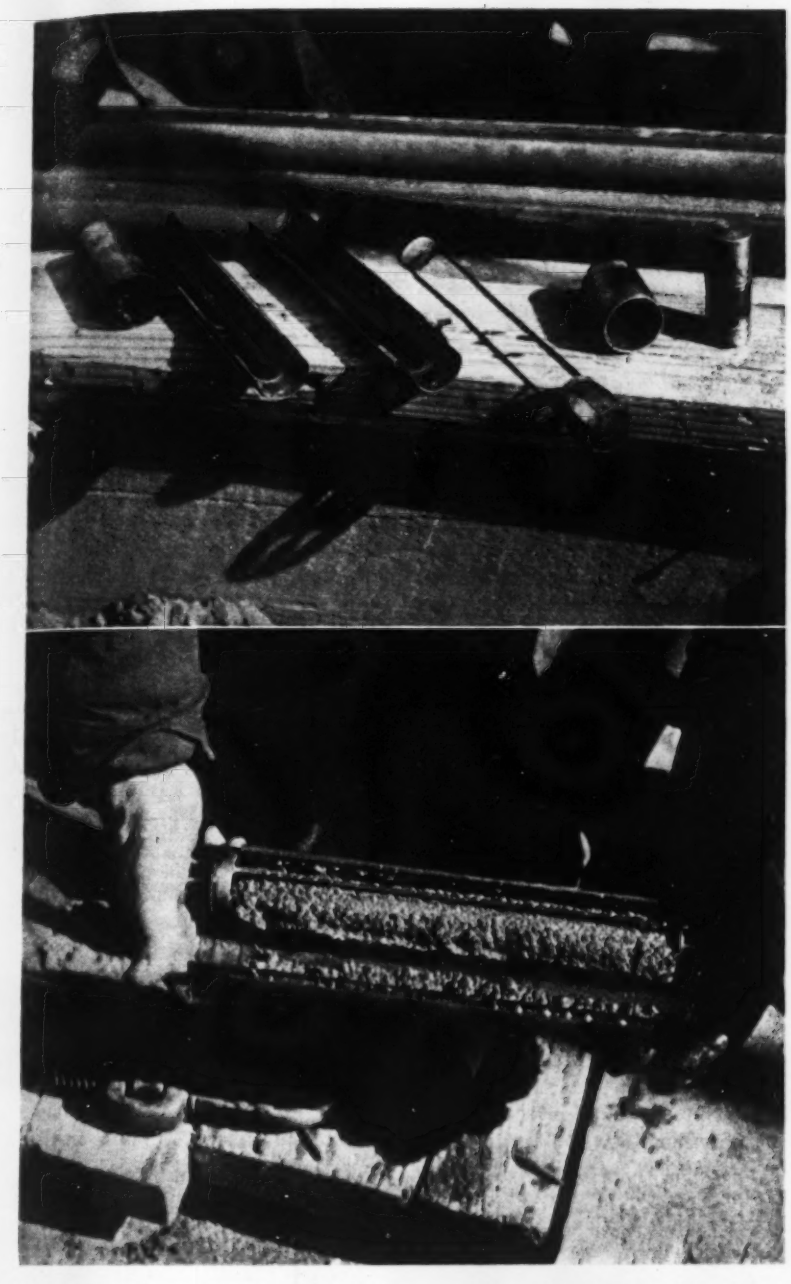

Fig. 2. The above view shows the various separate parts of the sampler. Below a slushy sample illustrates the usefulness of the device in cohesionless soils.

be used directly to hold the spring leaves in the open position. This arrangement is possible by simply spreading the leaves around the bottom end of the cylinder. The top end of the cartridges will be closed, except for an air and water vent, so that the shell will be lifted out of the grip of the leaves as is the trigger ring in the present model.

The sampler was designed by the writer with the help of Mechanical Engineer E. A. Riemenschneider and built in the Brooklyn Bridge machine shop of the Department of Public Works, with the approval of Commissioner Irving V. A. Huie. It was developed under the direction of J. Frank Johnson, chief engineer of the department, and Girard E. Wheeler, chief of the department's subsurface exploration section, for which the writer is in charge of the actual boring work. L. P. Brown, senior civil engineer, is head of the division operating the machine shop. George Baker, foreman machinist, rendered valuable help.

Cities Allowed to Build Reserve Funds

LOCAL GOVERNMENTS have the necessary legal authority in eight states to lay up money now for financing public improvements which will be needed after the war, according to the American Municipal Association.

Reserve funds will give cities and counties wide latitude in planning post war construction and rebuilding of deteriorated facilities without saddling themselves with debt. The construction itself will provide a cushion for absorbing manpower released from war industries and the armed forces.

Not a war idea

Though five states — New York, Michigan, Washington, Kentucky and New Jersey—adopted their cash reserve fund laws in 1941 and 1942, the legislation is not a "war idea," the association said. First law of this kind was adopted by Oregon in 1931 to help cities avoid long-term borrowing and debt for public improvements long after they had worn out.

Oregon authorizes cities, counties and school districts to use accumulated reserves for financing construction of public projects and to buy street and fire-fighting equipment. California cities are authorized by a 1937 law to set up cash reserve funds by ordinance specifying their use. There is no limit on the amount levied annually nor upon the time levies may be extended. Nebraska's fund-enabling legislation of 1939 limits levies, to be approved by voters, to a ten-year period.

Recent authorizations

Of the states taking action more recently, New York and Washington have the broadest laws. The New York act authorizes the local governing body to make levies without limit on time and amount and without an election. Washington's law is similar, but requires that purpose of any proposed levy must be specified in the ordinance making the levy and may be changed only by a majority vote at a general or special election.

The Michigan act applies to school districts only, while the Kentucky law applies only to boards of education in second-class cities. This year's New Jersey law permits municipalities to budget annually, until the end of the war presumably, for a public works reserve fund.

Neglected Items in Storm Sewer Design

John Wilson
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***Contents in Brief**—All too often storm sewer designs are based on guesses rather than engineering studies. More accurate designs are possible if engineers will consider frequently neglected features of temperature of falling rain, exposure of slopes to sun as affecting snow melting, quantity and water content of snowfall, and rainfall during periods of snow melting.*

WHILE DESIGN OF STORM SEWERS must necessarily involve a certain amount of guessing as to probable runoff, this all-too-frequent practice of basing the design entirely on guesswork may be avoided by considering several features—often overlooked or neglected—of ground conditions, temperature, snow and rainfall. Factors adding to more intelligent design include preponderance of north and south slopes in a drainage area which affects rate of snow melting and corresponding runoff, temperature of rain falling on snow, likewise affecting rate of snow melting, amount and frequency of rainfall during periods of snow melting, and amount of snowfall and water content of the snow.

In the north country around Duluth most trouble with storm sewers in suburban districts occurs during April and May. During these months when the snow is melting, and while the ground is still frozen, the form of precipitation is changing from snow to rain. These rains are not excessive in quantity, are not of frequent occurrence, and the intensity is much less than that of rains that come in later months. Most of these rains come before the weather bureau's automatic instruments are put in service, so that intensity records are quite meager in comparison with the summer measurements.

Data on rain temperature needed

Many engineers have an exaggerated notion as to the amount of snow melted by falling rain. Furthermore, there are few data available regarding the actual temperature of rain water as it reaches the ground and its ability to melt snow.

In Duluth, normal temperatures increase 10 deg. during April, but in the meantime the sun's rays at noon have advanced 10½ deg. in the sky. This change in angle is responsible for much of the temperature increase, but as far as the snow surface is concerned it may be all compensated for, depending upon whether the ground has a steep northerly or southerly slope. The snow on southerly slopes will melt in colder weather than that on northerly slopes, and the resulting runoff may be completed before that from the northerly slopes begins.

Runoff, at best, is a complicated problem, but the spring flood particularly is involved. The problem really begins in October, when the fall rains are replenishing the ground water storage. These rains may be enough to saturate the soil, they may furnish only enough water to saturate the ground partly, or they may be so scant as to leave it quite dry for November's freeze up. During the next five months a considerable part of the precipitation is accumulated on the ground surface, but just how it will get away and just what may be the intensity of discharge cannot be determined, although an intimate knowledge of the particular district in question will make possible a reasonable forecast.

The mean precipitation in Duluth for the months from November to May will exceed the calculated evaporation by slightly more than 6 in. Some of this water will reach the streams before the general breakup begins, but a very considerable part is likely to be retained as snow and ice, some will be retained as water by the snow and ice, and again much of it may be changed from ice to water and back to ice again several times before it reaches an outlet, all of which complicates calculations. The snow water from the southerly slopes will discharge more uniformly, slowly, and may precede that from the northerly slopes by two to three weeks.

Normal temperature for April is 37 deg.; the normal precipitation is 2.06 in., about 25 percent of which is snow. By May, the normal mean temperature has increased to 47.3 deg., the growing season is well established by the end of the month, and the normal rainfall is 3.25 in. For May the amount of precipitation as snow is negligible. April rains in excess of ¼ in. per day occur about 2.7 times per year, for May four times, for June and July 4.5 times. Rains in excess of 1 in. per day may be expected every two to three years in April, on an average of 0.8 times per year in May, 1.1 times in June, and once a year in July.

Maximum wind movements

In April the wind movement reaches its maximum, and the prevailing wind is from the northeast, so that both weather and rain are cold. It is apparent that April rains are below those of the following months in frequency, quantity and intensity. However, it is these rains and those of early May that cause most of storm sewer troubles in this district.

In falling, raindrops carry a certain amount of air from a great height, which is compressed as the rain reaches the ground, incidentally increasing its temperature, although it will still be cooler than prevailing air temperatures. From data available, the rain drop will be from 3 to 15 deg. colder than the air. Normal temperature here for the last two weeks of April is about 40 deg., so the raindrops have a temperature of near 35 deg. or only 3 deg. above freezing. As 144 B.T.U. are required to transform 1 lb. of snow at 32 deg. to water at the same temperature, 48 in. of rain 3 deg. above freezing will be needed to produce 1 in. of water from melting snow.

New snow weighs from 5 to 12 lb. per cu. ft. Very soon after falling, it

begins to settle under its own weight, a tendency greatly increased by light rains and thawing that takes place on warm days. Raindrops have a diameter from ½ to 4 mm., and reach the ground at a velocity, depending on their size, up to 26 ft. per sec. So, at times, the raindrop has considerable driving force and may pack the snow as nothing else can; in fact, it may pack the snow beyond the point of saturation and thus set free much water previously absorbed, with practically no melting.

The breakup on the northerly slopes is liable to take place when the general temperature is 5 deg., or more, above that prevailing at the time runoff occurred on the southerly slopes. Thus the snow is softer, more easily packed, and the rainfall gradually increases both in quantity and intensity, all tending to release the stored water more promptly and in larger quantities.

During April and May, about 55 percent of the precipitation occurs at night when the normal temperature is about 9 deg. below the noon temperatures for the same period. There is, therefore, a tendency for the night rainfall to be retained for discharge with the day precipitation when the temperature is higher.

Of course, no definite statement is possible, but the maximum spring runoff may be expected to take place when a day rain follows a night rain and the mean noon temperature is near 45 deg. During the period from 10 a.m. to 4 p.m. probably not more than ¼ in. of water would be furnished by melting snow, even if the ground were completely covered, although a very flashy flood with a one-hour rain is entirely probable.

The maximum intensity of rainfall for an hourly period in late April or early May, expected once in ten years, is close to 45 percent of that which may be expected during the summer months. The coefficient of runoff for a district as described might be taken as 45 percent in the application of the rational theory.

For a period of ten years and a concentration of one hour, the intensity may be considered as about 1.7 in. per hr.; 45 percent of this would be 0.765 in. or, in round numbers, 0.75 in., which is equal to 100 percent runoff for spring intensities. Five inches of wet snow might hold 2½ in. of water, but the chances of the ground being uniformly covered are quite remote, so the water content can be halved, making it 1¼ in. Now if one-half of this one-half is set free in two hours it will increase the runoff by ¼ in., which, added to the 0.75, gives a total runoff rate of 1.08 in. or, in round numbers, almost 50 percent more than the general application of the rational method would indicate. In other words, approximately the same coefficient should be used as would be used normally for a closely built-up district.

Of course, in this case, there is more or less guessing all along the line, but a reasonable guess may pay well for the grey matter consumed. The assumed intensity of rainfall is probably within reason, also the amount of melting snow, but the quantity of water at first detained and then set free, and the rate at which it may be set free, is but a guess until records are available upon which estimates can be built up. We know that much water will be set free by packing the snow and the opening of channels, incidentally through which it may escape. No two cases will be alike.

Weather reports not complete

The weather bureau reports the amount of snow on the ground, but it does not measure the water content. Measurements of snow on the ground apply to very limited districts, and maximum runoff from snow accumulation may take place after the weather bureau reports no snow. Each runoff district is a problem in itself, but a close analysis of the ruling characteristics of that district, with a reasonable understanding of those characteristics wherever they may be found, will provide the essential element for transforming a guess into an estimate.

It seems to be taken for granted by authorities on hydrology that data pertaining to the intensity and frequency of rainfall, if taken from a large number of stations, will approach the probable more closely than a long record in the immediate vicinity. Take, for example, the U. S. Meteorological Yearbook, 1937. The map suggests a group around Duluth, Marquette, Minneapolis and Moorhead, and the records below have been taken from that report.

It is difficult to see how the records at Marquette will be of very much aid in solving storm sewer problems in Duluth. The direction of the wind at Minneapolis is usually near right angles to that at Duluth, while our temperatures lag behind.

It seems quite evident that before detailed data of neighboring cities are considered, first must be determined whether influencing conditions are similar, otherwise comparisons may be in error. It is also quite possible that the policy of using data from a large number of stations may discourage local observations, because of the thought that by bunching data of other points our own may have little value.

What is needed are more complete weather records, including:

1. Automatic measurements of rainfall intensities, including April.
2. Records of snow on the ground, including water content, from several different points, together with complete information regarding the general conditions at each point.
3. More records of temperature of falling rain.
4. More stations closer together where influencing conditions are similar.
5. Finally and most important, more information regarding topographic conditions of various watersheds, in such form to be correlated with weather bureau reports. Weather bureau reports are not complete nor as much in detail as we would like to have them, nevertheless they are much in advance of other necessary information, if we are to eliminate guessing to a reasonable extent.

The design of storm sewers is one of the few calculated conclusions that does not include a factor of safety. It is also one of the few engineering activities where "by the grace of God" or something else, an engineer can absolve himself of all responsibility by "an act of God." Accordingly, the temptation to make one big guess and save engineering thought is too often present.

	Duluth	Marquette	Minneapolis	Moorhead
Number of clear days	110	75	110	132
Sunshine possible for March, percent	76	51	64	—
Days with south wind	16	118	115	180
Days with northeast wind	187	25	38	39
Annual snowfall	57.6	116.7	38.2	81.2
Maximum hourly precipitation in inches for individual storms	0.41	0.96	0.59	0.70
	1.53	0.57	0.86	0.41
	0.76	—	1.18	0.52
	0.74	—	1.22	0.69
	1.27	—	—	0.52
	—	—	—	0.35

Repair of Tractor Parts by Welding

J. A. Cunningham
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***Contents in Brief**—Modern welding methods to repair various parts of a crawler tractor are outlined step by step. Data are made available as to the man hours of work necessary to rebuild each part, the cost of each repair, and the amount of wear that can be expected from the repaired member as compared to new parts.*

CONSERVATION OF STEEL and the need to keep every piece of construction equipment operating has made arc welding more valuable than ever before as a means of quick and inexpensive repair of tractors, shovels and other heavy machinery. In rebuilding and resurfacing worn or broken tractor parts this process has found wide application.

Principal advantages of this method include: (1) The iron and steel saving is 90 percent or more of the weight of the worn parts, because the electrode required for the reconditioning work seldom amounts to 10 percent of the part's weight; (2) valuable time is often saved, as compared to waiting for new parts; (3) correctly reconditioned parts usually wear 20 to 100 percent longer than new ones, if the right types of electrodes are used, since the deposited metal is harder and more wear-resistant than the original; and (4) large money saving is possible because resurfacing by arc welding costs less than the new parts. See Table 1.

As an illustration, this article will discuss techniques and electrodes used in resurfacing the worn parts of a large crawler-type, diesel tractor. The electrodes recommended for certain applications and used in the repairs for which costs are given are suggested by the author out of his experience. Other makes of electrode, however, are also suitable. Thus, Lincoln Wear-weld, Airco 91, Champion Wear-Devil A, Metal & Thermit Co's. Rolex 450, or any other electrode suitable to resist severe impact and moderate abrasion could be substituted for General Electric W-93, and any electrode meeting AWS-ASTM Filler Metal Specification E6010 for General Electric's W-22.

Likewise, Stoody Self-hardening, Haynes-Stellite's Hascrome or any drawn type, hard-surfacing, high-carbon electrode, containing 4 percent chrome and 2 percent molybdenum and resistant to a combination of impact and abrasion could be used in place of American Manganese Steel Co's. Economy. For the Moly-H electrode, which is made by Chicago Hardware Foundry Co., few substitutes are known, but an alloyed, cast-iron electrode, containing approximately 3 percent molybdenum and 1½ percent copper or nickel, capable of withstanding heavy abrasion and moderate impact, might be used for Moly-H, if Moly-H were not obtainable. The costs in Table I may or may not be reproducible with other than the electrodes listed. Also, when parts are worn to a greater extent, the costs in Table I must be proportionately increased.

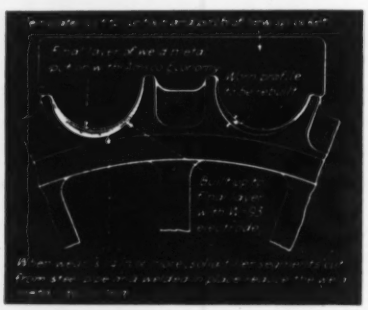


Fig. 1—Worn drive sprockets rebuilt by welding methods outlined above are good as new.

Fig. 2—This handy gage for rebuilding bottom rollers may be made by welding two 9x5/8x1/8-in. steel bars to a steel plate cross member shaped as indicated.

Rebuilding driving sprockets

When the driving sprockets become so worn that the track bushings slide instead of rolling on the teeth and cause seizing or galling, the tooth contours must be restored to their original shape. Usually this operation can be accomplished without detaching the sprockets from the tractor, although the track will have to be removed.

The normal procedure involves the use of a template, usually made from ⅛-in. sheet metal and shaped to conform to the pitch and tooth contour of a new or unworn sprocket (Fig. 1).

In case the template shows that not more than one layer of weld metal is needed to restore the contour, the application of Amsco Economy electrode will best meet all requirements. If more than one layer is required, all but the final layer are put in with shielded-arc, Type W-93 electrode, which has proven especially desirable as a base deposit for hard-surfacing because it is inexpensive and at the same time impact resistant. This procedure provides an inexpensive base of medium hard metal, which stands up well under the harder, final layer deposited with the Amsco Economy electrode.

When the template reveals the wear to be more than ¼ in., a piece of solid metal may be used to advantage to reduce the number of layers of weld metal needed to restore the contour (Fig. 1). It is common practice to cut such segments from ordinary iron pipe, the outside diameter of which is chosen to fit the curvature of the

worn contour while the length is equal to the width of the sprocket teeth.

Experience shows that the pipe segment's width should not exceed 1⅜ in. Hence, two or three segments may be used in each contour, spaced about ¼ in. apart, to permit welding solidly to the base metal. With filler segments in place, a minimum gap of ⅛ in. should remain for deposit of the hard-facing electrode. Before starting the hard facing, the segments are welded in place with a shielded-arc, mild-steel electrode such as Type W-22 or W-20. Also, after this surfacing has been completed, it is often necessary to run a bead between each end of the segment and the sprocket. This extra reinforcement is required because of the extra wear along the sprocket's outside edges.

All welding should be done in the downhand or flat position, a procedure made possible by simply revolving the sprockets as welding progresses. To prevent overheating, only one pass is deposited on any one tooth before proceeding to the next. The weld is always deposited at the lowest part of the unfinished contour, starting from one side and welding across the entire width.

Since both sprockets revolve in unison, one pass is applied to each tooth in the entire upper half of one and the process is repeated on the other sprocket before rotating the two. To reduce further the amount of turning necessary to bring the teeth into the welding position, and also to reduce the passes, each pass can be made approximately ¾ in. wide by weaving.

No grinding or other finish of the hard-surfacing deposit is needed be-

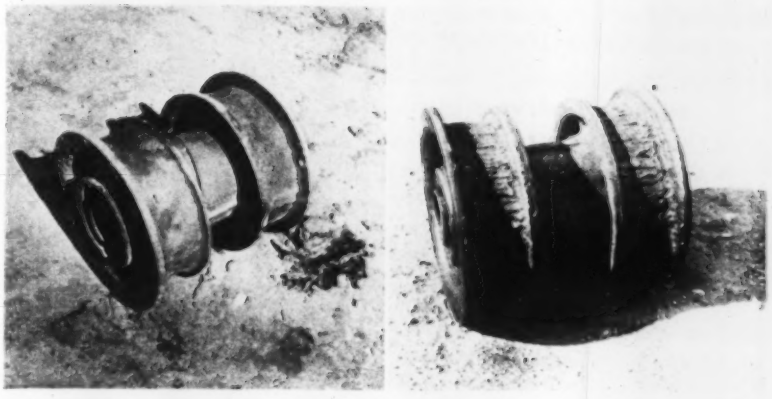


Fig. 3—Bottom roller (left) before and (right) after being rebuilt by welding. The repair work cost $36 per set while a new set would cost $240.

cause the tracks engaging the sprockets are full floating and, with the contours fully restored, the bushings have a rolling rather than a sliding engagement. The rolling does not produce excessive wear on the bushings, and the welded surfaces soon wear smooth, since sand and mud are thrown on the sprockets by the ever-moving tracks. Sprockets rebuilt in accordance with the above procedure soon take a bright surface polish and, because this surface is so much harder and more wear-resistant than the original material, the repaired parts last twice as long as new ones. The track bushings also wear longer, since there is less tendency toward seizing or galling of the polished weld metal and the bushing as wear occurs.

Repair of bottom rollers

When the bottom rollers become worn they can often be restored to better than original usefulness (Fig. 3). Usually the actual welding is done after removing the rollers from the tractor. However, when the flanges do not need rebuilding, the welding may be accomplished by removing the entire arm supporting the lower rollers and placing it in an inverted position. The particular type of wear to which bottom rollers are subjected requires a combination of Moly-H electrode for rebuilding the face and Type W-93 for rebuilding the flanges. If the face is badly worn, two layers of Moly-H may be required, the first being applied to the badly worn or dished-out regions and the final layer woven across the entire face.

The flanges are built up to the original dimensions with Type W-93, since this electrode produces a smooth finish and adds strength and stiffness to the flanges. In addition, it will not spall or flake when subjected to impact or flexing. Grinding or other finishing is unnecessary—regardless of whether the rails are to be reconditioned—since normal service soon smooths the wearing surfaces.

To aid in judging the amount of

TABLE I—SAVINGS OBTAINED BY REPAIRING THE WORN PARTS OF A LARGE CRAWLER-TYPE DIESEL TRACTOR BY THE ARC WELDING PROCESS

Tractor part	Cost of new parts	Repair cost (A)	Saving	Service from rebuilt parts	Rebuilding time	Weight, size and type of electrode required
Driving sprockets	$179 per pair	$49 per pair	$130	Twice that of new parts	30 hours 1 layer of W-93 and 1 layer of Amsco Economy	25 lb. ¼ in., W-93 30 lb. ¼ in., Amsco Economy
Bottom rollers (set of 12 double rollers)	$240 per set	$36 per set	$204	Twice that of new parts	24 hours 1 to 2 layers of Moly-H and 1 layer of W-93 on flanges	50 lb. ¼ in., Moly-H 10 lb., ¼ in., W-93
Front idlers	$141 per pair	$13 per pair	$128	Twice that of new parts	8 hours 1 layer of Moly-H and 1 to 2 layers of W-93	20 lb. ¼ in., Moly-H 6 lb. ¼ in., W-93
Track rails (144 links for both tracks)	$261 per set	$40 per set	$221	50 percent more wear than new parts	24 hours 1 layer of Moly-H 1 layer of W-93 on edges	45 lb. ¼ in., Moly-H 30 lb. ¼ in., W-93
Track grousers (72 plates for both tracks)	$216 per set	$43 per set (C)	$173	20 percent more wear than new parts	22 hours 2 passes of W-22 and 1 layer of Moly-H	40 lb. ⅛ in., W-22 14 lb. ¼ in., Moly-H
Top rollers (B) (4 double rollers complete)	$54 per set	$11 per set	$43	40 percent more wear than new parts	6 hours 1 layer on face only	10 lb. ¼ in. Amsco Economy
Drawing clevis and carrying scraper universal	$72 for two	$5 for both	$67	50 percent more wear than new parts	4 hours 2 to 6 layers of W-93	50 lb. ¼ in., W-93 1 lb. ⅛ in., W-93

(A) Rebuilding costs include labor and materials and are based on a rate of $1 per hour. Where labor costs are different the economy of the rebuilding will be influenced accordingly.
(B) Top rollers rebuilt successfully when worn not more than ⅛ to ¼ in. If wear is greater they are likely to crack because the cast iron, from which they are made will not withstand the shrinkage stresses of a great deal of welding. Preheating is sometimes advisable to prevent cracking.
(C) Includes 120 ft. of mild steel filler bar stock. ⅜ by 1¼ in. for rebuilding the cleats.

deposit needed on both the face and flanges, a handy gage may be made as illustrated in Fig. 2.

Rebuilding front idlers

When the front idlers become worn, they can also be rebuilt. If one layer of weld metal is required to restore the worn rims, it is applied entirely with a Moly-H electrode. This electrode not only meets the requirements for wear on these idlers but it also answers the metallurgical requirements to best advantage. If two layers are required, however, the first is applied with a W-93 electrode because of its resistance to mushing, spalling or flaking. Likewise, with the rims worn down so that they are cracked or bent, the cracks are cut out and rebuilt with Type W-22 electrode, after which the resurfacing metal is applied.

A Type W-93 electrode is also used on the flanges of the idlers to produce a smooth finish, and a slight taper is maintained on the flanges as they are built up. In rebuilding each rim, the width is checked to make sure that the middle section is built up to symmetrical proportions. Grinding or other refinishing is unnecessary in repairing the idlers.

Track rails rebuilt

In rebuilding the faces of track rails much the same procedure is followed as with the idlers and rollers. If more than one layer is necessary, all the first layers are welded with a Type W-93 electrode, while the final layer is with a Moly-H electrode either by weaving or in stringer beads. Care should be taken to rebuild the rails flat across the face to prevent "dishing out" of the rollers. In general, it is better to rebush the tracks before hard-surfacing the rails. Otherwise, assembly after rebushing may be difficult, due to the overlapping of the hard-surfacing deposits between the links.

If the track is worn narrow because of friction against the roller flanges, both the inside and outside edges may need a layer or two from the Type W-93 electrode in order to restore the original width of the tracks. It is important that the edges of the rails, as well as the flanges of the idlers and rollers, be rebuilt so that they have no more side play than new parts.

Top rollers are usually cast iron and it is not considered practical to rebuild them if they are worn down more than about $\frac{1}{8}$ to $\frac{3}{16}$ in. However, when wear is not too severe, welding is practical if the heat is kept low. This is accomplished, and at the same time excellent wearing qualities are obtained, by using Amsco Economy electrode and by applying only one bead to each roller face before allowing it to cool.

To apply a bead to one roller then the other, and so on, is good practice, since this gives each of the rollers a chance to cool before applying the subsequent beads. Each bead is applied with a weaving technique halfway across the face and all the way around. Also, the lowest heat that will obtain proper fusion is used for this work. Amsco Economy electrode flattens out smoothly and fuses well with the chilled cast iron of which most of these rollers are made.

To hard-face grouser cleats with Moly-H electrode before they have had a chance to wear excessively is practical. Likewise, a second application after the first has worn away will further prolong the useful life of the cleats and avoid rebuilding or replacement. In cases where the cleats are worn down to within about $\frac{1}{2}$ in. of the grouser plate, they may be rebuilt to extend their useful service. For this purpose a mild steel bar of about $\frac{3}{8}$-in. width and $1\frac{1}{4}$-in. height is welded on top of each cleat with Type W-22 $\frac{3}{16}$-in. electrode. The ends should be tapered toward the center at an angle of 30 deg. with the vertical to permit a strong welding job. The top edge of the rebuilt cleats should then be hard-faced with a layer of Moly-H electrode.

Wear of the drawbar clevis and universal hitch is met to best advantage by rebuilding with Type W-93 electrode. Since the clevis cannot be removed conveniently, metal must be deposited in the vertical position when rebuilding the holes in which the drawbar bolt fits. The $\frac{3}{16}$-in. dia. electrode is used for this work and is applied with a wide weave.

The drawbar bolt should be inserted in the hole frequently and pounded from one side to the other to make sure it will fit into position when the weld has cooled. Other worn surfaces that can be welded in the flat position are restored with a W-93 electrode of $\frac{1}{4}$-in. diameter. It is also common practice to weld a washer over the hole to reduce the amount of weld metal required (Fig. 4).

Fig. 4—Rebuilt drawbar clevis. Note the use of a washer around the lower hole to reduce the weld metal required.

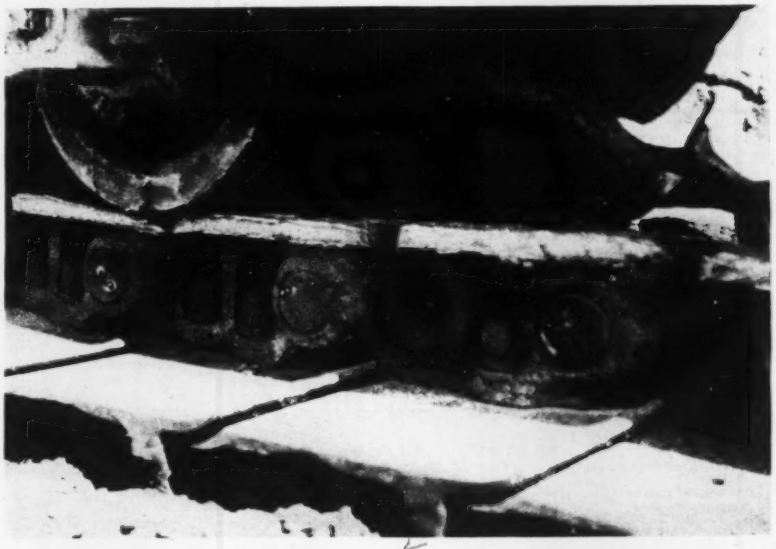


Fig. 5. Properly rebuilt rails and rollers remove excessive lost motion, an important requirement for effective tractor performance.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Batch Counters for Concrete Mixer

In a concrete mixing plant, where concrete from one mixer might go to any of three different concrete pumps and to three different locations, old trolley fare-meters are used at batch counters. Three fare-meters are hung, one above the mixer discharge chute to each of the pumps, and the operator "rings up a fare" for each batch put in the particular pump.

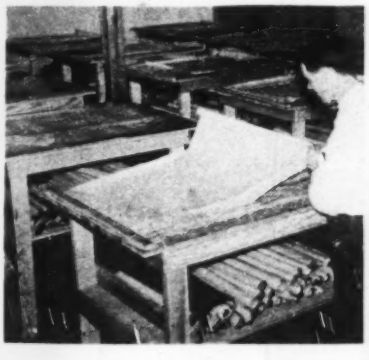
Good Record at San Francisco For Meter Service Department

About 128,000 water meters on the San Francisco water system are inspected, tested, serviced and generally maintained and repaired by a crew of four men. This covers all bench work that is necessary on 5,000 to 6,000 meters per year brought into the repair shop. In addition about 4,000 new meters are tested. The repair operations include cleaning and replacing worn parts and testing.

Useful Tables for Blueprints

When Hart, Freeland & Roberts were unable to obtain filing cabinets for the blueprints used in their work as architect-engineer on an ordnance plant, they built the small but handy wooden tables shown above. The plans or blueprints for one special phase of the work was kept on each table. For example, those for the highways would be on one table and those for railroads on another.

In order to prevent people from walking off with a set of plans each set was bolted to the top of its respective table at the right edge by two small bolts. This arrangement also prevented the plans from dropping on the floor if the top blueprints were flipped over the edge of the table when one wanted to look at a drawing toward the bottom of the group. The lower shelves of the table provide convenient storage for obsolete plans and extra prints.



Field and Office Comment

Sir: The writer read with interest the formulae "devised" by Joshua Tabatchnik for the calculation of bending moments due to equal concentrated loads, equally spaced, on a simple beam (*ENR*, April 23, 1942, p. 627). I should like to add, however, that I have been using the formulae for many years in my office, particularly with moment distribution methods of analysis.

In such cases the following additional corresponding formulae for fixed-end moments have been found useful.

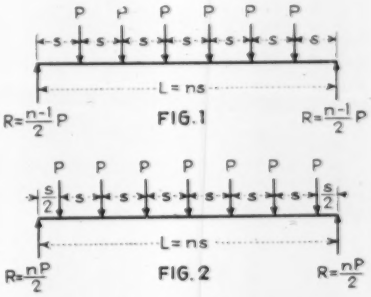
For beams with both supports A and B fully fixed

$M_A = M_B = -\left(\frac{n+2}{n+1}\right)\frac{PL}{12}$ and for support A fixed but B free $M_A = -\left(\frac{n+2}{n+1}\right)\frac{PL}{8}$ where P = total load and n = number of equal loads, even or odd.

—G. G. MEYERHOF,
Structural Engineer and Designer, London, England

Sir: In *ENR*, April 23, 1942, p. 627, Joshua Tabatchnik makes available a formula for computing the bending moment on a simple beam with equal concentrated loads evenly spaced. Some 40 years ago John L. Hall of "Table of Squares" fame and head of the engineering firm where I was employed developed a similar but simpler formula for this loading.

Referring to the accompanying diagram, when n is even $M = \frac{nPL}{8}$ for both the loading conditions in Figs. 1 and 2.



For the loading conditions above simplified formulas may be prepared, that will save time on the part of designing engineers.

When n is odd $M = \frac{nPL}{8}\left(\frac{n^2-1}{n^2}\right)$ for the loading shown in Fig. 1 and $M = \frac{nPL}{8}\left(\frac{n^2+1}{n^2}\right)$ for the loading in Fig. 2.

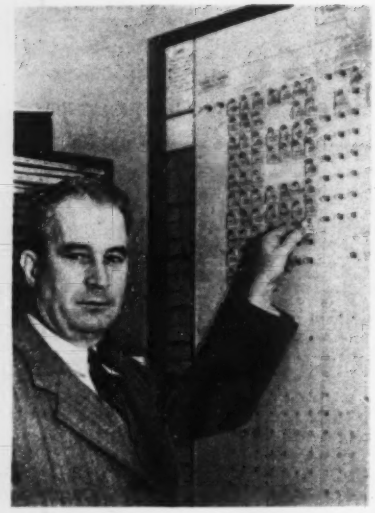
It is readily seen that $\frac{n^2-1}{n^2}$ and $\frac{n^2+1}{n^2}$ approach unity as n increases so that for practical purposes these factors need only be used when n is 3, 5 or 7, and possibly 9. For more spaces the correction is academic, as it amounts to only eight-tenths of one percent when n is 11 and is less for larger values of n.

F. W. SEIDENSTICKER,
Structural Engineer, City Hall, Chicago, Ill.

Handy Billboard for Recording Duties of Personnel

At the Providence, R. I., district office, U. S. Engineers, T. S. Burns, chief of the engineering division, finds the billboard illustrated in the accompanying photograph very valuable when a large staff is employed. The scheme was to develop a board to show not only all the jobs underway and every worker and his duties, but to arrange for easy transfer of the men's names as they were shifted about and as the work changed.

The solution was construction of a wooden 3 x 4-ft. base with horizontal grooves at even intervals. At the upper left was added a small card upon which was written "Project Number" while in the extreme right-hand corner was added a card titled



This billboard, by showing the duties of a large staff, has proven very valuable in the office of T. S. Burns (left), chief of the engineering division, Providence District, U. S. Engineers.

"Number of employees working on project." Then between these two columns was glued a chart with the columns headed administration, engineering, etc. Next the board was covered with a thin layer of glass and to this were glued small brass hooks in neat rows under each heading except over the two outer columns.

Thus, it was possible to slip small cards in back of the glass at the left to list the various jobs in progress and in the horizontal slots to slide in a short length of aluminum bar to divide the board horizontally. In the same way as at the right, cards could be inserted to show the number of men working on each job.

To list each man's duties, the name of every worker was printed on a cardboard tab and this tab hung on one of the hooks in the proper column. To transfer a man's name from one location to another takes only a moment and to make it easier to add and remove the tabs, the hooks were glued on with their openings at the bottom. In order to determine at a glance the head of each department, a black diagonal mark was painted across all supervisors' checks.

Such a board is worth while only when a large group of men are employed and a diverse program, of many projects is being designed. Then it is very valuable, according to Mr. Burns. He sees no reason it could not be used to advantage on large construction jobs where the men are apt to be shifting about still more often than those on office work.

Mr. Burns also believes that where a cheaper board is desired it would be possible to fasten a sheet of glass to the wooden board and then use a grease pencil to mark directly on the glass the columns, titles and necessary lines. Next the hooks could be added to complete in a few minutes a satisfactory board.

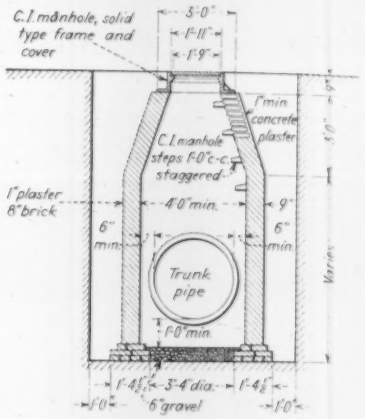
Notes From War Jobs

METHODS USED TO SPEED CONSTRUCTION AND WIN THE WAR

Runway Inlets with Gravel Bottoms Aid Airport Drainage

In building the drainage systems for several airfields as part of the war program, the Providence (R.I.) District, U. S. Engineers, is using an open instead of a closed bottom in runway inlet catchbasins and manholes, that is, a layer of gravel is substituted for the customary concrete bottom, as illustrated by an accompanying drawing. This idea, which is not original to army work but was used by the engineers in building the Rhode Island State Airport, provides for much of the surface water collected by the catch basins and manholes to be dispersed throughout the sub-base.

As a result flows through the interconnecting pipes and outfalls are greatly reduced. On some airfields where the ground-water level is low and the soil of a pervious nature this reduction is estimated at 25 percent of maximum runoff flows. Thus, the size of the necessary piping and the labor and cost of the drainage system are greatly reduced. The gravel bottom should of course be used only where the groundwater is several feet below the drainage system as reverse flow should be avoided.



A gravel bottom on this typical manhole for airport drainage permits much of the inflow to pass into the sub-base. Thus, the size of the interconnecting pipe is reduced.

Concrete—On an Army camp job where small amounts of concrete were needed infrequently over a widely dispersed area, it was found expedient to use storage boxes, such as pictured below. The boxes were filled at intervals by concrete-hauling trucks, and their use eliminated the need for holding a truck until all the concrete was placed. Not only did this procedure reduce the number of trucks required on the job, but resulted in substantial savings, because trucks are hired on an hourly basis.

RITECURE

(with temporary green color indicator)

THE ORIGINAL COLORLESS CURE FOR CONCRETE

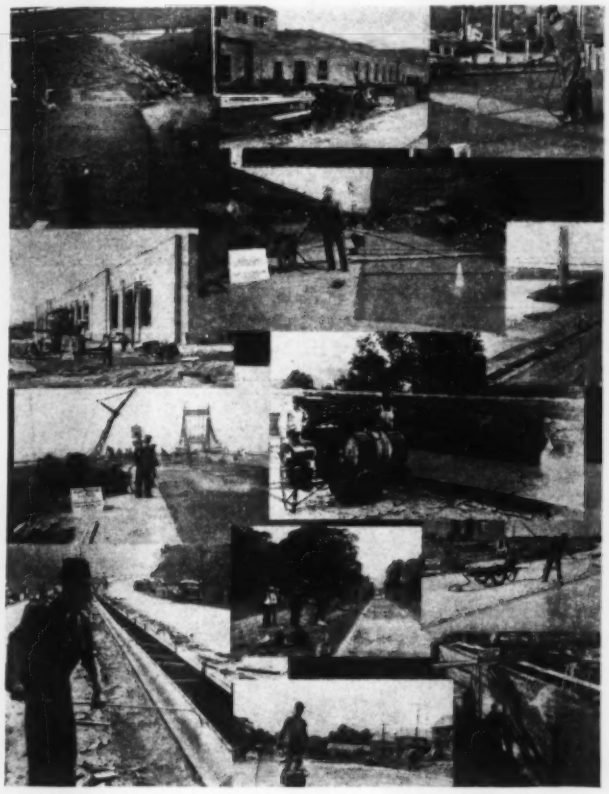
Brings Laboratory Curing Conditions to the Job

Figure Curing Costs on the concrete—not in the drum

CONCRETE FACTS

Ritecure **is the result of years of constant scientific research. The same engineers and chemists who pioneered the development of Hunt Process and originated the membraneous curing method developed this improved Ritecure formula with its 60% solids, non-hazardous solvent, saponification factor and easy sprayability.**

Ritecure **differs both chemically and physically from other so-called "colorless curing" compounds, in that the major ingredients are chemically active. Its effective moisture retention is the result of designed chemical action with the concrete surface which results in the protective membrance unique with Ritecure. Due to the high percentage of solids only one coat is required. Standard coverage is 300 sq. ft. per gallon.**



Ritecure **is saponifiable and, therefore, neutralizes the calcium hydroxide by the formation of calcium resinate. This reaction toughens the protective film, and unlike the inert resin and wax type of compounds, which do not react with the concrete, increases the abrasion resistance and ultimate durability of the concrete surface.**

Ritecure **imitations come on the market, are sold on a few projects, and then disappear. Imitation is the sincerest form of flattery, but Ritecure continues to lead the way with every constructive development in the membraneous curing field. The only high-pressure element about Ritecure is the spray gun. This original, standard, colorless curing compound is sold on facts, backed by years of successful usage.**

Ritecure **was not suddenly created to meet a demand. Instead its merit and economy was determined years prior to the era of war construction by major federal agencies and other recognized concrete laboratories, as well as by widespread field experience. Constant research brought on successive improvements which culminated in the newest formulae—at no increase in price.**

Ritecure **is approved and specified by practically all the major awarding agencies. Censorship prohibits publication of the names or widespread location of projects on which Ritecure has been and is being used, but the list is a "Who's Who" of the modern construction industry. When you buy Ritecure, you buy quality, safety, coverage and solid content. Figure your costs on the concrete—not in the drums. Engineers and contractors know from long and satisfactory experience that they can always depend on Ritecure, the original membraneous concrete curing compound.**

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Ask for factual data—our technical staff is at your service

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

WATER SUPPLY LINES, SEATTLE, WASH.

OWNER: Seattle Water District No. 20, Seattle, Wash.; Gardner, Gardner & Hitchings, Arctic Building, Seattle, engineers.

PROJECT: Construction of approximately 8.5 miles of water supply lines ranging from 4 to 10-in. diameter, in suburban area south of Seattle, Wash. Involves connection of new lines to existing city lines, clearing, grading, necessary excavation, and furnishing and laying of cast iron water pipe. Alternates were asked on three different types of pipe lines: cast iron pipe, cement-asbestos pipe, and wood pipe. Contract was awarded on the basis of cast iron, though both of the other alternates were lower.

CONDITIONS: Contractor to furnish all material. No time limit was set for completion. Rail and water transportation facilities are available to Seattle, and highway to site of work. Wage rates are: skilled labor, $2.00 per hr.; semiskilled, $1.65; and common, $1.25.

BIDS: Three bids were received June 12, 1942 on the cast iron pipe lines, ranging from $106,324 to $113,991. Two bids on the cement-asbestos pipe alternate were $102,510 and $103,795; and on the wood pipe alternate, $89,708 and $95,817.

LIST OF BIDDERS: Cast iron pipe—basis of award.

1. Valley Construction Co., Seattle, Wash. (contract) $106,324
2. L. Colluccio, Seattle, Wash 107,149
3. Angelo Scarsella, Seattle, Wash 113,991

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 10-in. connection to city main	1 ea.	$1,300.00	$1,300.00	$1,300.00
2. 6-in. connection to city main	1 ea.	800.00	800.00	800.00
3. Clearing	1 ac.	600.00	400.00	400.00
4. Grading	4,000 c.y.	.75	.60	.60
5. Crossing pavement	80 l.f.	10.00	6.50	3.00
6. Extra excavation	900 c.y.	2.00	1.30	2.50
7. Salvaging present 4-in. pipe	5,000 l.f.	.20	.50	.25
8. Relay salvaged 4-in. pipe	1,300 l.f.	.50	.40	.75
9. Goosenecks, complete in place	100 ea.	7.40	5.50	10.00
10. 10-in. gate valves, in place	3 ea.	92.00	125.00	90.00
11. 8-in. gate valves, in place	13 ea.	61.00	85.00	65.00
12. 6-in. gate valves, in place	13 ea.	42.00	52.00	45.00
13. 4-in. gate valves, in place	16 ea.	28.00	no bid	30.00
14. Valve chambers, conc. or brick, etc.	5 ea.	80.00	90.00	85.00
15. Valve boxes, cast iron	48 ea.	10.00	12.00	10.00
16. Replace 6-in. wood pipe with 8-in. wood pipe; contractor to retain 6-in. wood pipe (SW 136th St.)	3,600 l.f.	1.75	1.80	no bid
17. 4-in. bolted c.i. pipe or welded steel pipe; complete in place with extra excav.; concrete piers and fasteners; for creek crossing. (400 l.f.)	L.S.	1,100.00	780.00	1,600.00
18. 8-in. cast iron pipe, in place	12,100 l.f.	2.46	2.60	2.60
19. 8-in. cem. asbestos pipe (alternate)	12,100 l.f.	2.24	2.50	no bid
20. 8-in. wood pipe (alternate)	12,100 l.f.	1.83	2.25	no bid
21. 6-in. cast iron pipe	9,600 l.f.	1.88	1.80	2.00
22. 6-in. cem. asbestos pipe (alternate)	9,600 l.f.	1.81	1.75	no bid
23. 6-in. wood pipe (alternate)	9,600 l.f.	1.59	1.65	no bid
24. 4-in. cast iron pipe	14,900 l.f.	1.51	1.45	1.55
25. 4-in. cem. asbestos pipe	14,900 l.f.	1.49	1.35	no bid
26. Saddles for 4-in. cem. asbestos pipe (alt.)	150 ea.	7.00	2.00	no bid
27. Wood pipe, 4-in. (alternate)	14,900 l.f.	1.37	1.30	no bid
28. 10-in. cast iron pipe	4,740 l.f.	3.16	3.30	3.40
29. 10-in. cem. asbestos pipe (alternate)	4,740 l.f.	2.90	3.20	no bid
30. 10-in. wood pipe (alternate)	4,740 l.f.	2.29	2.60	no bid

WILLAMETTE RIVER BRIDGE OREGON

OWNER: Oregon State Highway Commission, Portland; G. S. Paxson, bridge engr.

PROJECT: Construction of two timber pile trestles each 95-ft. long, one timber pile trestle 75-ft. long, and one bridge consisting of 290-ft. of timber pile trestle and one 180-ft. Howe-truss span for bridge over coast fork of Willamette River, and pile trestle bridges on the Goshen-Pleasant Hill section of the Willamette Highway in Lane County, Ore., approximately 13 miles east of Eugene. Timber truss designed for H-15 loading and requires unusually heavy timbers due to extreme length of truss and width of roadway. Lower chords of timber truss are made up of three 14 x 16-in. timbers; upper chords are three 14 x 14-in. Floor beams are 14 x 14-in. Split ring timber connectors are used in all splices. Roadway stringers on truss consist of eleven lines of 6 x 18-in. stringers. Deck made up of 4 x 12-in. planking laid transversely to center line and covered with 2 x 2-in. Port Orford or red cedar strips laid longitudinally.

CONDITIONS: Contractor to furnish all materials except metal reinforcing for concrete piers, and complete work by December 3, 1942. Highway transportation facilities available. Wage rates are: skilled labor, $1.20 per hr.; semi-skilled, 90c; and common, 62½c.

BIDS: Three bids were received June 4, 1942, ranging from $53,774 to $79,960.

LIST OF BIDDERS:

1. Tom Lillebo, Reedsport, Ore. (low bidder) $53,774
2. C. J. Eldon, Portland, Ore 66,398
3. McNutt Brothers, Eugene, Ore 79,960

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Shoring, cribbing, etc	L. S.	$1,600.00	$7,500.00	$12,300.00
2. Structural excavation	70 c. y.	5.00	12.50	6.00
3. Struct. excav. below elevations noted	5 c. y.	8.00	16.50	20.00
4. Class A concrete	100 c. y.	33.00	30.50	55.00
5. Transport and place reinforcing steel	7,000 lb.	.04	.04	.20
6. Furnish untreated piles	3,600 l. f.	.32	.25	.50
7. Drive untreated piles	120 ea.	19.00	25.00	40.00
8. 180-ft. Howe truss span	1 ea.	22,600.00	27,500.00	20,900.00
9. Untreated trestle superstr. with 24-ft. roadway	300 l. f.	29.00	27.50	43.00
10. Untreated trestle superstr. with 26-ft. roadway	280 l. f.	31.00	28.50	55.00
11. Untreated lumber in trestle substr.	24 M bm.	108.00	110.00	130.00
12. Removal of old bridge	L. S.	2,200.00	5,040.00	1,200.00

HIGHWAY, ARKANSAS

OWNER: Arkansas State Highway Department, Little Rock.

PROJECT: Concrete paving 14.69 miles of State Highway 65 in Chicot County, Ark., from Lake Village to McGehee Rd. Involves all necessary excavation, Type 9-B cement concrete paving, construction of temporary crossings, culverts, and riprapping.

CONDITIONS: Contractor to furnish all materials and complete project in 160 working days. Rail and highway transportation facilities available. Minimum wage rates prevailing are: skilled labor, 65c. per hr.; semi-skilled, 40c.; and common, 30c.

BIDS: Two bids were received July 2, 1942, the contract low of $595,148, and $659,668.

LIST OF BIDDERS:

1. Gregory-Hogan, Little Rock, Ark. (contract) $595,148
2. J. P. McNulty, Pine Bluff, Ark 659,668

Item	Quan.	Unit Prices (1)	(2)
1. Common excavation	29,615 c.y.	$0.60	$0.70
2. Dry excavation, for structures	114 c.y.	2.50	3.00
3. Wet excavation, for structures	20 c.y.	5.00	3.00
4. Selected materials	18,664 c.y.	1.00	.70
5. Fine grading, subgrade and shoulders	190,625 c.y.	.06	.06
6. Portland cem. conc. pavmt. (Type 9-B)	190,625 s.y.	2.65	3.00
7. Traffic lane stripe	10,560 l.f.	.10	.80
8. Construct temporary crossings	3 ea.	200.00	100.00
9. Class A concrete	22.56 c.y.	30.00	30.00
10. Class B concrete	4.32 c.y.	30.00	30.00
11. Reinforcing steel	1,350 lb.	.10	.20
12. 24-in. non-rein. conc. pipe culv.	8 l.f.	5.00	4.00
13. 30-in. non-rein. conc. pipe culv.	24 l.f.	6.00	6.00
14. Riprap	300 c.y.	3.00	4.00
15. Remove and replace riprap	90 c.y.	3.00	4.00
16. Remove traffic service gravel and construct shoulders	15,573 c.y.	1.50	1.00
17. Remove and stockpile traffic service grav.	13,225 c.y.	1.00	1.00

America is now thoroughly awake to the seriousness of what lies ahead. There is a definite realization that we can lose this war if we do not take advantage of every one of our national resources.

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HIGHWAY RELOCATION CONNECTICUT

OWNER: Connecticut State Highway Dept., Hartford.

PROJECT: Bituminous macadam paving 17,055 feet of highway in connection with the relocation of Route 12 in towns of Groton and Ledyard, Conn. Pavement width 22-ft.; thickness 8½-in.

CONDITIONS: Contractor to furnish all materials and complete work in 210 days. Rail, highway and water transportation facilities available. Traffic must be maintained at junctions and crossings, and on portions of old road where relocated roadway is identical or where it crosses. Wage rates are: skilled labor, $1.37½ to $1.80 per hour; semi-skilled, 75c. to $1.25; and common, 75c.

BIDS: Five bids were received June 15, 1942, ranging from the low of $423,668 to $526,360. Previously bids were asked on this job May 25, but all bids were rejected and the project was readvertised.

LIST OF BIDDERS:

1. Oneglia & Gervasini, Torrington, Conn. (low bidder) $423,668
2. A. I. Savin Constr. Co., East Hartford, Conn 463,342
3. N. D. Maselli Corp., Bloomfield, Conn 506,641
4. L. Suzio Constr. Co., Meriden, Conn 507,192
5. N. Benvenuti & Sons, New London, Conn 526,360

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	17,955 l.f.	$1.00	$2.00	$0.50
2. Earth excavation	147,942 c.y.	.45	1.00	.50
3. Rock excavation	68,464 c.y.	1.75	1.00	2.50
4. Trench excav., 0 to 6-ft. deep	3,338 c.y.	1.30	2.00	2.00
5. Trench excav., 6 to 10-ft. deep	70 c.y.	2.00	2.00	2.00
6. Borrow	42,509 c.y.	.35	.50	.65
7. Formation of subgrade	46,539 s.y.	.12	.10	.20
8. Shape and clean slopes and shoulders	17,955 l.f.	.40	1.00	.50
9. Sub-base	27,200 c.y.	1.25	.60	1.10
10. Gravel fill	9,291 c.y.	1.25	.60	1.40
11. Broken stone (for base course)	18,117 ton	2.25	2.50	2.75
12. Broken stone (for bit. mac. surf. crse.)	7,376 ton	2.75	2.50	3.10
13. Rolled gravel surface	403 c.y.	1.25	1.50	1.50
14. Traffic bound gravel surface	125 c.y.	1.25	1.50	1.50
15. Bit. mat'l. for surface treatment	40,027 gal.	.16	.12	.15
16. Bit. mat'l. for bit. mac. surf. crse	117,778 gal.	.16	.12	.14
17. Furn. and apply sand cover	40,027 s.y.	.05	.05	.05
18. Class B concrete	268 c.y.	20.00	20.00	18.00
19. Concrete for steps and copings	3 c.y.	35.00	30.00	50.00
20. Portland cement	400 bbl.	2.75	2.50	3.00
21. 15-in. vitrified clay pipe	135 l.f.	1.31	2.00	2.00
22. 18-in. vitrified clay pipe	1,176 l.f.	1.93	2.20	2.50
23. 24-in. vitrified clay pipe	834 l.f.	3.12	2.50	4.00
24. 48-in. rein. concrete pipe	80 l.f.	9.10	7.00	12.00
25. 60-in. rein. concrete pipe	256 l.f.	14.33	12.00	18.00
26. Underdrains with 6-in. perf. conc. pipe	5,975 l.f.	1.20	1.50	1.75
27. Outlets for underdr. with 6-in. conc pipe	547 l.f.	1.00	1.50	1.50
28. Paved ditches	50 s.y.	3.00	1.50	4.00
29. Plain concrete park curbing	100 l.f.	1.00	1.00	2.00
30. Guide posts	2,742 ea.	3.30	3.00	3.00
31. Stone wall fence	9,000 l.f.	1.25	1.00	1.25
32. Barways	12 ea.	13.00	12.00	15.00
33. Board fence	1,215 l.f.	.55	.50	.60
34. Concrete marker post	2 ea.	16.00	15.00	25.00
35. Maintenance of traffic	L.S.	2,000.00	5,000.00	2,500.00

WATER MAINS, MICHIGAN

OWNER: City of Detroit, Board of Water Commissioners, Detroit, Mich.; L. G. Leuhardt, general sup't.

PROJECT: Construction of water mains along Belton Avenue and Meyers Road (Contract DM-1), and on Meyers Road from Belton to West Chicago Avenue (Contract DM-2) in Detroit, Mich. Includes furnishing and laying of approximately 7,900 feet of 72-in. steel shell reinforced concrete pressure pipe; 96 feet of 48-in. steel shell reinforced concrete pressure pipe; all necessary 12-in. cast iron pipe, and sewer pipe ranging from 12 to 24 in. in diameter. Furnishing and placing of gate valves is also included. Alternates were allowed on the gate valves, either the American Waterworks Association specifications, or Detroit Department of Water Supply specifications could be installed. Contract was awarded on the former basis.

CONDITIONS: Contractor to furnish all the materials and completed in 150 days. Contractor is to purchase manufactured pipe. Rail and highway transportation facilities avail[illegible] near site of work. Wage rates specified are: skilled labor, [illegible] to $1.75 per hour; semi-skilled, $1.25; and common, [illegible].

BIDS: Four bids were received on each contract July [illegible], 1942. On Contract DM-1 the bids ranged from $220,000, the [illegible] contract low, to $225,000. On Contract DM-2 they ranged from [illegible] contract low of $233,099 to $245,000.

Contract DM-1—Belton Ave. and Meyers Rd.

LIST OF BIDDERS:

1. Gargaro Co., Inc., Detroit, Mich. (contract) $[illegible]
2. Chris Nelsen Co., Royal Oak, Mich [illegible]
3. Frank J. Knight Co., Centerline, Mich [illegible]
4. N. D. Mancini & G. Vella, Base Line, Mich [illegible]

Item	Unit	Unit Prices (1)	(2)	(3)
1. 72-in. steel shell reinforced conc. pressure pipe (3,946 l.f.)	l.f.	$43.00	$52.00	$53.12
2. 12-in. cast iron pipe (incl. specials)	l.f.	8.00	5.00	4.50
3. Sewer manholes	ea.	225.00	250.00	225.00
4. 6-in. drain	l.f.	4.60	3.00	2.00
5. 12-in. sewer	l.f.	5.00	3.50	4.00
6. 15-in. sewer	l.f.	5.25	3.50	5.00
7. 18-in. sewer	l.f.	6.25	9.00	8.00
8. 24-in. sewer	l.f.	7.00	11.50	10.00
9. 12-in. A.W.W.A. gate valves	ea.	89.00	110.00	125.00
10. 48-in. A.W.W.A. gate valves	ea.	2,750.00	3,500.00	3,500.00
11. 12-in. D.W.S. gate valves (alternate)	ea.	no bid	145.00	150.00
12. 48-in. D.W.S. gate valves (alternate)	ea.	no bid	4,000.00	4,000.00

Contract DM-2—Meyers Rd. from Belton to West Chicago Ave.

LIST OF BIDDERS:

1. Frank J. Knight Co., Centerline, Mich (contract) $233,099
2. Gargaro Co., Inc., Detroit, Mich 234,000
3. Chris Nelsen Co., Royal Oak, Mich 243,311
4. N. D. Mancini & G. Vella, Base Line, Mich 245,000

Item	Unit	Unit Prices (1)	(2)	(3)
1. 72-in. steel shell rein. conc. pressure pipe (3,956 l.f.)	l.f.	$57.35	$43.00	$59.90
2. 48-in. steel shell rein. conc. pressure pipe (96 l.f.)	l.f.	40.50	24.00	42.00
3. 12-in. cast iron pipe	l.f.	4.90	8.00	5.00
4. Sewer manholes	ea.	225.00	225.00	250.00
5. 12-in. sewer	l.f.	4.00	5.00	3.50
6. 12-in. A.W.W.A. gate valves	ea.	125.00	89.00	117.00
7. 16-in. A.W.W.A. gate valves	ea.	325.00	188.00	350.00
8. 48-in. A.W.W.A. gate valves	ea.	3,500.00	2,750.00	3,600.00
9. 12-in. D.W.S. gate valves (alternate)	ea.	150.00	no bid	135.00
10. 16-in. D.W.S. gate valves (alternate)	ea.	400.00	no bid	425.00
11. 48-in. D.W.S. gate valves (alternate)	ea.	4,000.00	no bid	4,300.00

BRIDGE IMPROVEMENTS, OKLAHOMA

OWNER: Oklahoma State Highway Department, Oklahoma City.

PROJECT: Concrete paving and channel changes at bridge over Bird Creek, north of Tulsa, Tulsa County, Okla. Includes 0.134 miles of 22-ft. plain cement concrete paving (9-7-9-in.), and improvement of 700 by 200-ft. channel area.

CONDITIONS: Contractor to furnish all materials and complete work in three months. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.00 per hour; semi-skilled, 60c.; and common, 40c.

BIDS: Two bids were opened June 16, 1942, the contract low of $57,403, and $57,438.

LIST OF BIDDERS:

1. J. Briscoe, Stillwater, Okla (contract) $57,403
2. Ottinger Bros. Co., Hinton, Okla 57,438

Item	Quan.	Unit Prices (1)	(2)
1. Class D excavation	120,616 c.y.	$0.42	$0.42
2. Rolling	157 hr.	2.00	3.00
3. Sprinkling	353.43 M gal.	1.50	1.25
4. Overhaul	12,000 sec.y*	.03	.04
5. Shoulders	0.134 mi.	400.00	300.00
6. Plain cem. conc. pavmt. (9-7-9-in.)	1,421.4 s.y.	3.00	2.85
7. Plain riprap	240 c.y	3.50	3.00
8. Remove concrete pavement	1,233.4 s.y.	.30	.45
9. Right-of-way markers	4 ea.	3.00	5.00

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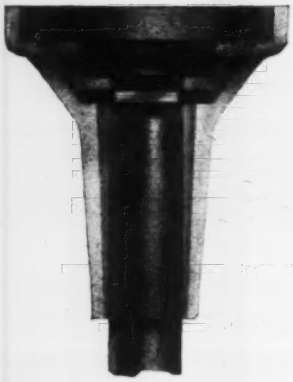

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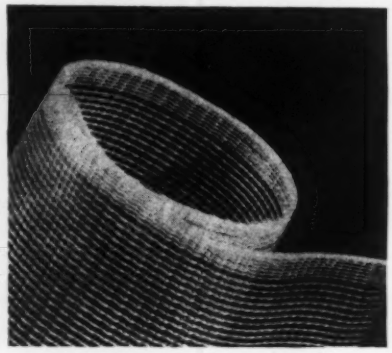


Safety Window Cloth

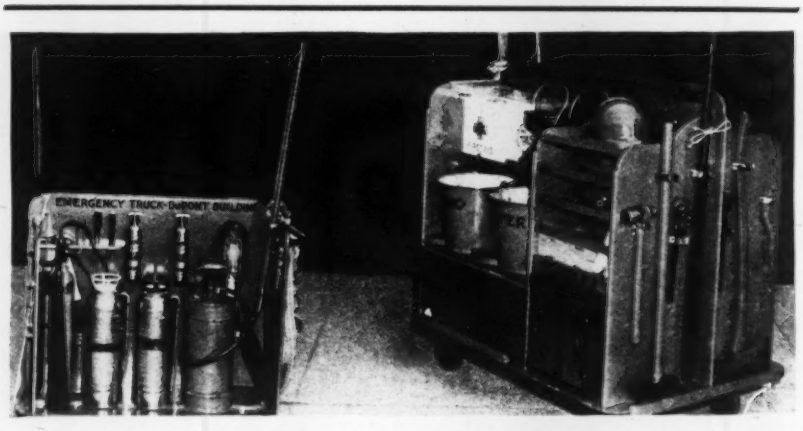
CECO safety cloth, a strong 10 mesh cotton cloth with a tough, transparent plastic film, has been made available in 100 yard rolls, 28-in. wide, by the Colloid Equipment Co., Inc., for providing either a permanent or emergency flexible window for buildings of any kind, without the use of priority metals and materials; or to be used as a protection upon the inside of glass windows, to reduce danger from shattering. The manufacturer claims that this new safety cloth is ideal for making quick repair replacements for glass, and a good means of limiting possible damage from air attack.—*Colloid Equipment Co., Inc., 50 Church St., New York, N. Y.*

Tubeless Tire Announced

Invention of a revolutionary heavy-vehicle tubeless tire—the goal of tire engineers for half a century—was announced recently by the B. F. Goodrich Co. The new invention is of primary importance because of the saving it makes possible in rubber ordinarily required for inner tubes and flaps. The use of a specially designed locking member which retains the air in the casing is the secret of the new development.—*The B. F. Goodrich Co., Akron, Ohio.*

Inspection

Four new models of "Super Sight" adapted to close inspection work, have been announced by the Boyer-Campbell Co. The magnifiers have one or two lenses, in varying sizes, and can be adjusted to cover a wide area over bench or table.—*Boyer-Campbell Co., 6540 Antoine St., Detroit, Mich.*



Hand Truck for Fire Protection

A specially designed hand truck compactly laden with 50-odd tools has been developed by du Pont technicians for use in its Wilmington office buildings. Combining the best features of various types of mobile emergency trucks with a number of original improvements, the four-foot long "buggy" is believed to be the most completely equipped vehicle of its kind. It carries an assortment of tools ranging from five types of fire extinguishers to a jack capable of lifting 3 tons. Included in the paraphernalia are a crow bar, sledge, goggles, shovel, electric lanterns, bolt cutters, tarpaulin, and other tools for the use of a 7-man crew. The buggy can be moved very easily by one man.—*Office Buildings Div., E. I. du Pont de Nemours & Co., Wilmington, Del.*

PROTECTING WIRE ROPE AGAINST CORROSION

This is Number 11 in a series of informative articles prepared by Macwhyte Wire Rope Company. The purpose of this series is to help wire rope users in these critical times to get the longest possible service from present ropes . . . through making useful facts on rope care more widely known.

The preceding article, No. 10 in this series, pointed out the causes of wire rope corrosion, where and when it was likely to strike. This article, No. 11, tells how to guard against corrosion. This and the previous ten articles in the series is available on request on your company letterhead.

Lubrication . . . its importance

No way has yet been found to remove the "causes" of corrosion. However, there is a method of protecting wire rope against corrosive elements . . . against atmosphere, weathering, or special conditions which subject the rope to either acid or alkaline substances.

That method is . . . *thorough lubrication.*

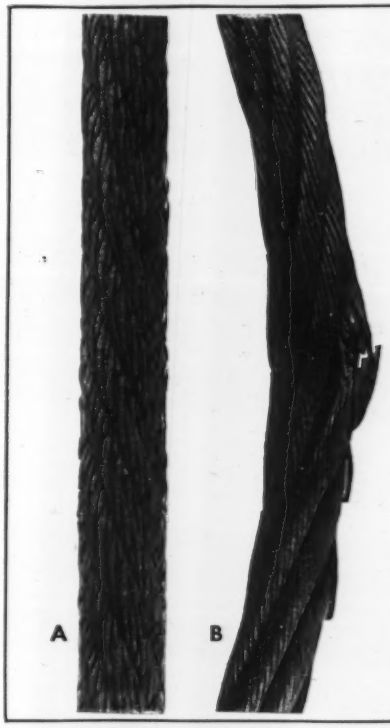
A recent and good illustration of such protective practice is found in the automotive industry. When car makers turned their plants into war production centers they ripped out massive automobile dies and machines worth millions, carted them to parking lots for the duration. When peace comes, back to work they will go.

Meanwhile these machines and dies are being protected against corrosion by a *thick coating of grease.*

Wire ropes, too, are machines. When in use (and more so when inactive) their parts need the protection good lubrication gives. Only when protected by lubrication (which retards corrosion) will they give the best possible service. Today, when we must all conserve what we have, such protection is doubly important.

Corrosion starts as soon as wires and strands are exposed to the elements and usually starts before one is aware of it.

In its early stages, corrosion is difficult to detect. The first signs are general discoloration of the wires of the rope. As corrosion progresses, the wires will become either pitted or covered with a reddish brown substance depending upon whether the corrosion is of an acid or alkaline type.



To *prevent such destruction...* LUBRICATE

Destruction came to these wire ropes much too soon. It might have been prevented. At an early inspection periodic lubrication would have added countless hours to the service life of these ropes.

A *This sample,* in addition to showing evidence of wear, is very badly corroded due to having been subjected to corroding conditions of an alkaline nature.

B *Lack of lubrication* caused the wires in this rope to become rust-bound. Fractures of this character occur when suddenly picking up the load or when the rope is flexed over the sheave, because the rust-bound wires cannot properly slide by each other. Notice the wires show very little evidence of wear.

NO. 612

Curb Corrosion and Conserve Steel

Corrosion is like an incurable disease which creeps up on a person gradually. You may check the damage it is doing, but you can never repair the damage done. Eventually it leads to early death of a rope whose service life could have been so much longer . . . with ordinary care.

Today corrosion is a very real enemy, destroying vital material (steel) needed for victory. If you inspect your ropes regularly, and apply lubricants freely, frequently, you are doing your bit to defeat this wire rope saboteur and get maximum service from your wire rope.

If you have further questions on corrosion (or any wire rope problems) feel free to write us about them. Simply address Macwhyte Company, 2940 Fourteenth Avenue, Kenosha, Wisconsin. Please write on your company letterhead.

MONARCH
Whyte Strand
PRE-FORMED
WIRE ROPE

Macwhyte's premier wire rope, famous for its strength, toughness, and internal lubrication

Made by

MACWHYTE COMPANY

2940 Fourteenth Avenue • Kenosha, Wisconsin

Mill Depots: New York • Pittsburgh • Chicago
Ft. Worth • Portland • Seattle • San Francisco
Distributors throughout the U. S. A.

Macwhyte Company Manufactures:
MACWHYTE PREformed and Internally Lubricated Wire Rope
MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable
MACWHYTE Braided Wire Rope Slings
MACWHYTE Cables, Tie Rods, Terminals, for Aircraft

WHEN SHORTAGES BRING YOU TO A DEAD END . . .

Let New Celotex Building Products Help You Find a Practical Way Around!

THE VICTORY program must not be halted. Countless military and industrial construction projects are being rushed to completion. But, just at the crucial moment, delay is often threatened by a shortage of some critical material. An A-1-a Priority doesn't do any good if there is none of that material to be had!

If your project has a high priority rating, there is often a practical way around such "dead ends"—by using Celotex Building Products, many of which have been specially developed to replace critical materials. Insulating exterior walls—partitions—shock-absorbing floors—built-up roofs and roof insulation—sound-conditioning for office and factory—these are a few of the needs Celotex Products can help you meet *immediately!*

Countless vital victory projects are moving ahead, *around the "dead end,"* because of the availability of dependable products provided by many Celotex plants working at full capacity. Write for your copy of our new Industrial Catalog No. 5—and see how many of *your* urgent demands are met by Celotex Products!

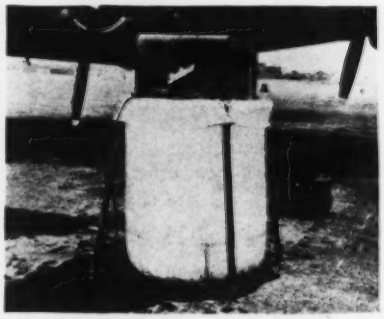
CELOTEX
BUILDING PRODUCTS

The word Celotex is a brand name identifying a group of products marketed by The Celotex Corporation.

THE CELOTEX CORPORATION • CHICAGO

Cranes

Able to lift and carry loads with their booms in any position, to move fast or slowly, as required, and operated by one man, the General Supercrane shown above is said to be a "natural" for use in shipyards, at ports of embarkation and around industrial plants and construction jobs. Because it is not confined to railroad tracks, this new type machine can roam at will, and, provided as it is with an extra low gear, can negotiate unfavorable terrain. Because the wheel mounted crane is provided with an extra wide gage, it has a greater lifting capacity over the side than similar size locomotive and crawler type cranes, and its comparatively long wheelbase makes it exceptionally stable when traveling and carrying heavy loads over front or rear.—*General Excavator Co., Marion, Ohio.*



Portable Water Purifier

A self-contained water purification unit that uses no chlorine or other chemicals has been designed by the Technicraft Engineering Co. Known as Sterozone Model B, it is light enough to be dropped by parachute in remote areas. The unit sterilizes water, kills bacteria, controls taste and color, and reduces color. Advantages claimed by the manufacturer are complete water purification without use of chlorine or other chemicals, automatic operation

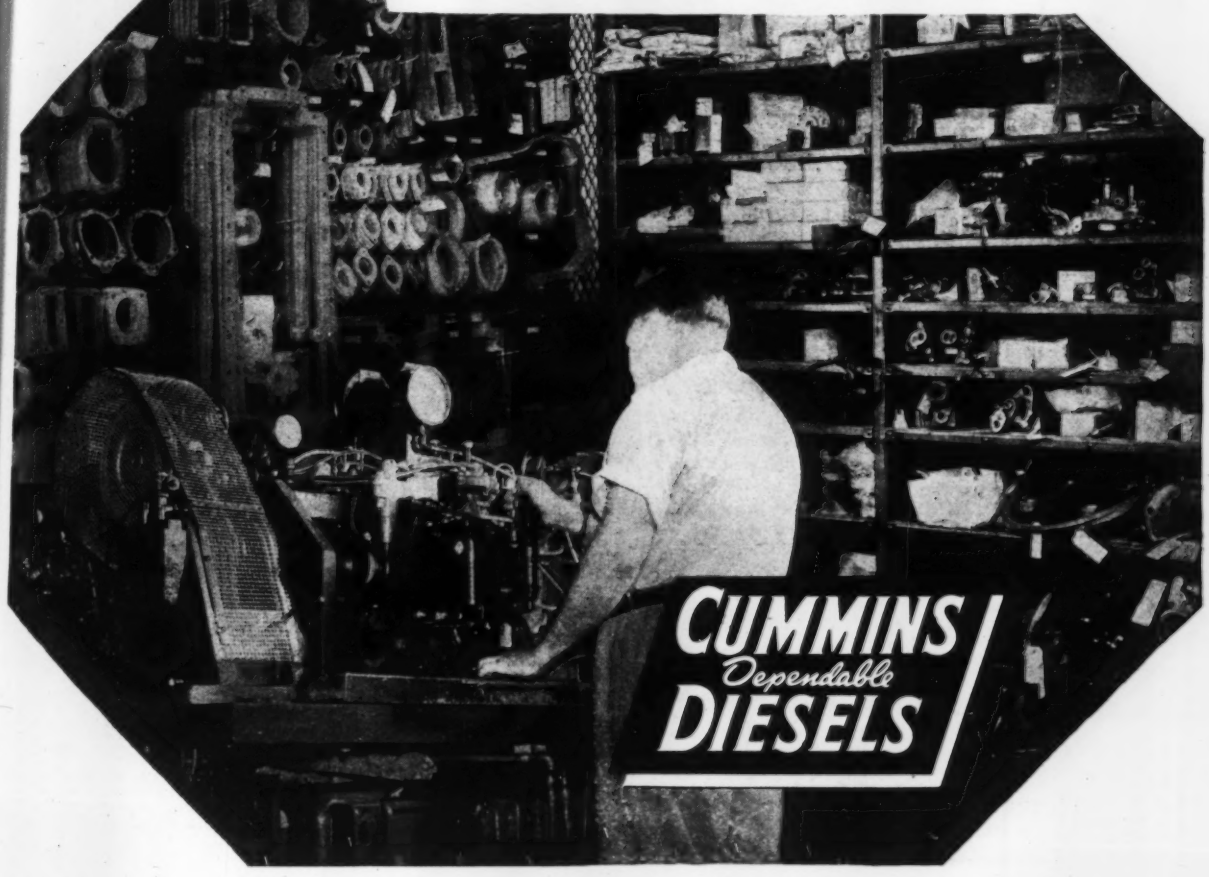
WAR DOUBLES ITS VALUE

The War, with its drastic demand for every material, is adding further proof of the value of Cummins Customer Service Policy . . . a policy that has always given first consideration to the needs of the owner.

Parts stocks carried at major traffic centers eliminate the need for huge inventories and needless duplication . . . an economic waste at any time, a double liability in War time.

With so many nationally-known trucks using Cummins Diesels as standard equipment, this Cummins Customer Service Policy is proving a boon to the manufacturer, a signal help to the War effort, because it assures parts stocks where they are needed most . . . the maximum use of every available part.

If, at times, you are irritated at what seems an unnecessary delay in delivery, remember: The fighting forces have first call on everything—engines or parts. That's the way we both want it—isn't it? Cummins Engine Company, Columbus, Indiana.



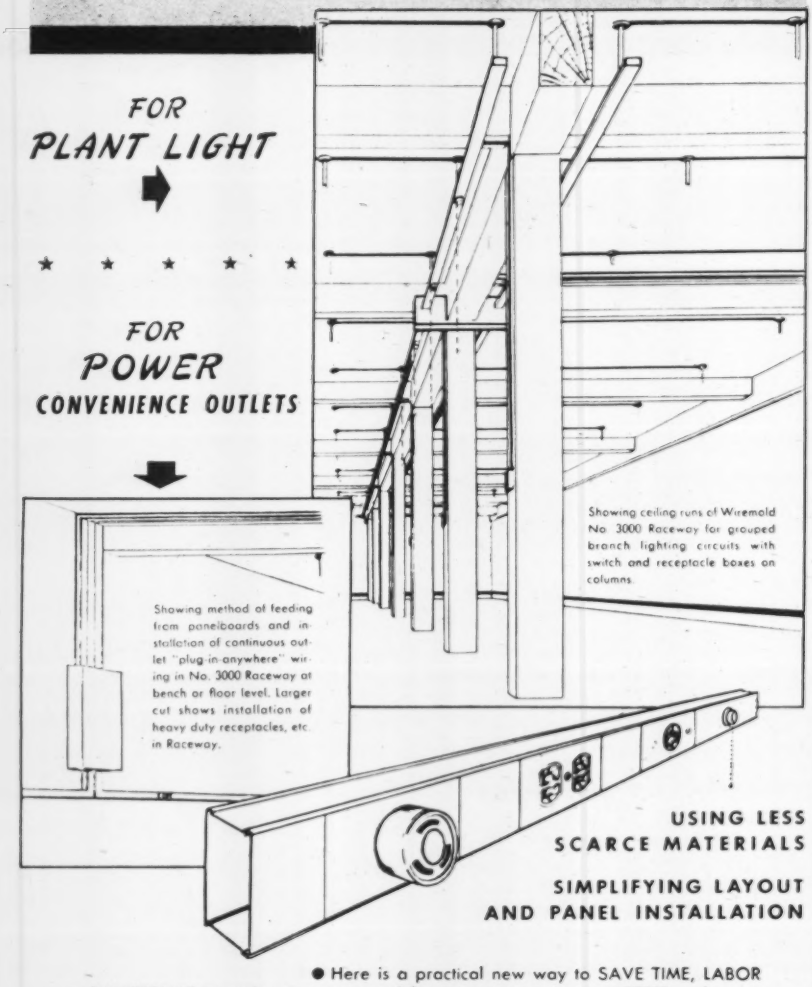
NEW APPROACH

TO FAST AND ECONOMICAL WIRING and REWIRING OF INDUSTRIAL BUILDINGS

FOR PLANT LIGHT

★ ★ ★ ★ ★

FOR POWER CONVENIENCE OUTLETS



Showing ceiling runs of Wiremold No. 3000 Raceway for grouped branch lighting circuits with switch and receptacle boxes on columns.

Showing method of feeding from panelboards and installation of continuous outlet "plug-in-anywhere" wiring in No. 3000 Raceway at bench or floor level. Larger cut shows installation of heavy duty receptacles, etc. in Raceway.

USING LESS SCARCE MATERIALS

SIMPLIFYING LAYOUT AND PANEL INSTALLATION

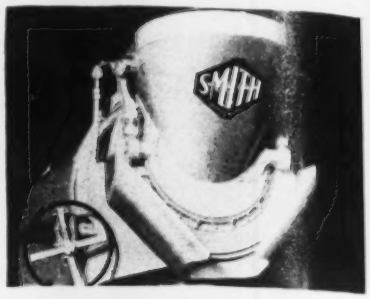
● Here is a practical new way to SAVE TIME, LABOR and MATERIALS on rush war contracts while giving your owners a BETTER and up-to-the-minute electrical installation . . . combining correct engineering layout for high-efficiency lighting with unique provision of "plug-in-anywhere" industrial convenience wiring at bench or floor levels. No bending . . . no threading. No special tools . . . just a good wireman with his kit required. Meets all Code and Underwriters' requirements. Write at once for engineering data sheets and catalog-wiring guide. The Wiremold Company, Hartford, Conn.

WIREMOLD

SYSTEM "3000" WIRING

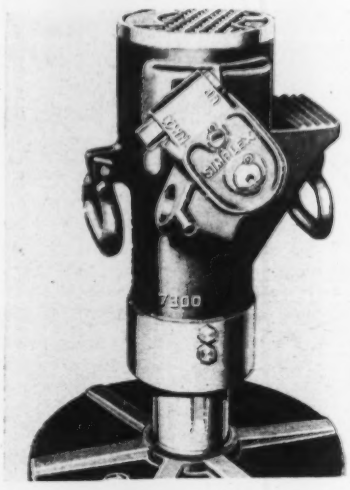
Wiremold Raceways and Fittings Conform to Federal Procurement Division Specification 540

that does not require supervision and extremely low-cost operation.—*Technicraft Engineering Co., 5610 S. Soto St., Los Angeles, Cal.*



Self-Aligning Feed Chute

Smith-Mobile Truck Mixers and Agitators are now furnished with a combination feed chute and closing door support that is self-aligning. It is said to eliminate the need for manual adjustments and assures smoother operation. A uniform contact between the revolving sealing ring and mixer drum is established throughout the entire 360 deg. surface, thereby compensating for whatever misalignment results from the weave in the truck chassis. In addition, the new design provides a self-cleaning feature. Grout which might work past the seal cannot possibly get into the bearing surface in which the sealing ring rotates.—*The T. L. Smith Co., Milwaukee, Wis.*



Standard Speed Screw Jack

The addition of a 25-ton standard speed, bevel gear, ball-bearing screw jack, No. 7300, is announced by Templeton, Kenly & Co. Designed for heavy-duty lifting, lowering and skidding work, the manufacturer states that the safe mechanical action, screw adjustment and inclosed ratchet mechanism combined with both toe and cap lift

Here's the wire rope that helps you get going

You've got a big job to do. That's why you need the wire rope that helps you get going *fast*—Preformed Yellow Strand. It's the limber, easy-to-manage line that installs quickly . . . spools evenly . . . takes heavy loads and high speeds with a minimum of breaking-in. But there's stamina, too, in its strong, elastic, drawn-to-order steel wires—inbred ability to resist kinking, crushing and fatigue; to secure the *full work-capacity* from men and machines through quicker starts, fewer shutdowns, more sustained production.

In wartime it's a duty and a necessity to use wire rope *efficiently*. Install Preformed Yellow Strand of the proper size and construction and make sure of all possible aid. Its longer life will conserve steel. Its low final cost will save money and widen your opportunity to serve America.

BRODERICK & BASCOM ROPE CO., ST. LOUIS

Branches: New York • Chicago • Houston • Portland • Seattle
Factories: St. Louis • Seattle • Peoria

FREE — this 96-page Hand Book on Industrial Wire Ropes; filled with useful facts and tables. Send for it today.

YELLOW STRAND *PREFORMED* WIRE ROPE

A MAINSTAY OF NATIONAL DEFENSE

REZNOR GIVES YOU A GOOD HEATING PLANT

INSTALLATION ADVANTAGES . . .

Far less installation time . . . Requires fewer men . . . Uses 89% less vital materials

BROAD PERFORMANCE . . .

Moves more air . . Moves air over wider areas . . Air circulation in summer

LOW COSTS . . .

Lower investment . . Lower maintenance cost . . No boiler room help . . Low fuel expense

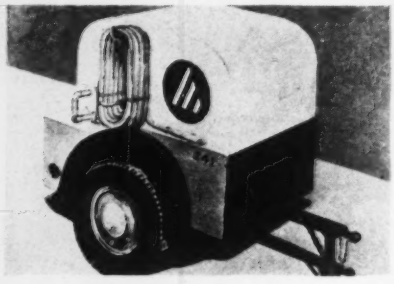
DEZNOR

Reznor Heaters operate with gas from a suspended position. They give ideal heating and ventilation in factories of all types and sizes. Whether it be for plant additions or for auxiliary heating and ventilation within existing properties, Reznor Unit Heaters offer benefits in installation time, floor space economy, and costs. One hundred and thirty-seven Army and Navy establishments and plants of countless war contractors use them. Reznor Heaters are available in all types and in a complete range of sizes. Write today for literature.

REZNOR MANUFACTURING CO.
105 James St. Mercer, Penna.

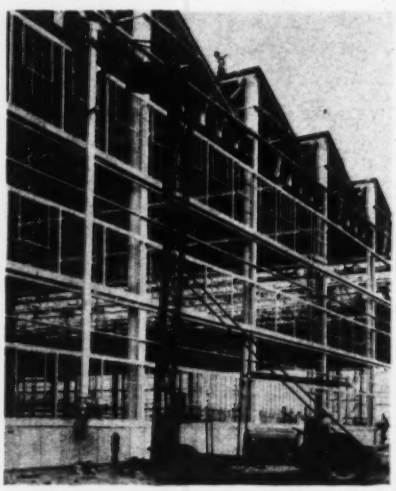
GAS HEATERS EXCLUSIVELY SINCE 1888

make it an ideal jack for all heavy industrial work. Toe lift is a minimum of 11 in. from base, but jacks can be made with toe in any position to suit user's requirements, and the basic design can be modified.—*Templeton, Kenly & Co., 201 N. Wells St., Chicago, Ill.*



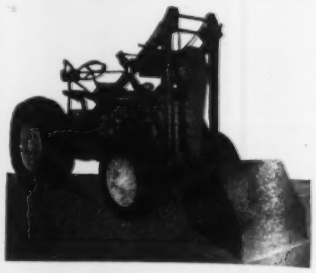
Fire Fighter

A completely self-contained, trailer type water purification unit that serves as emergency fire fighting apparatus, has been developed by the Technicraft Engineering Co. The unit, called the Sterozone Hydrovan, makes use of ozone to burn bacteria out of contaminated water and deliver clear water for drinking and domestic purposes where water supplies are damaged or destroyed. The Hydrovan is turned into a high pressure fire fighting engine by a simple clutch, to cut out the purification unit and deliver water at 200 lb. pressure through the 2½ in. hose.—*Technicraft Engineering Co., 5610 So. Soto St., Los Angeles, Calif.*



Stacker

Lewis-Shepard Sales Corp. have released literature this month on a 40-ft. telescopic portable elevator for use on maintenance and construction work. Among some of the more general uses for this stacker are the installation of sprinklers, wiring, lighting fixtures, etc. Specifications include: capacity, 1500 lb., overall height, 40 ft. 4 in., platform,



FRONT END SHOVELS
for Case Tractors
Extensible Booms—8' Lift
½ and ⅝ cu.yd. Capacity.

Other Products

CONCRETE VIBRATORS
Gasoline Engine and Electric Motor Driven Models

HEATING KETTLES
for Asphalt and Tar

AGGREGATE DRYERS
for Stone and Sand

ASPHALT PLANTS
Portable — Stationary

Write for Circulars

White Mfg. Co.
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CMC
DUAL PRIME CENTRIFUGAL
PUMPS

EXTRA SERVICE FROM PRESENT EQUIPMENT!

The simple design and ease of maintaining and servicing CMC equipment are features that mean money in the pockets of owners today. Your nearest CMC distributors is ready to help you get EXTRA SERVICE from your present equipment. Call on him.

CONSTRUCTION MACHINERY CO.
WATERLOO, IOWA

Concrete pavement experience records from all over the country have yielded a wealth of data helpful in wartime airport design. This information is available to assist in planning runways to get—

Adequate designs for expected loads (using minimum steel, often no steel).

Assurance of continuous, safe, dependable service in all flying weather with minimum maintenance and final cost.

Concrete provides necessary load carrying capacity for heavy duty at lowest first cost —and with a minimum volume of materials generally requiring minimum transportation facilities for construction.

On airports and all types of war construction our trained technical staff is ready to help designers and builders get maximum service from concrete.

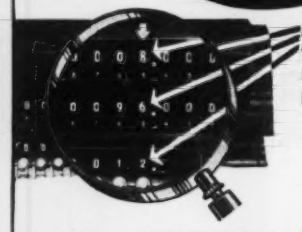
PORTLAND CEMENT ASSOCIATION

Dept. 8d-170, 33 W. Grand Ave., Chicago, Ill.

★ BUY WAR SAVINGS BONDS

for *Accurate Bills of Material*

and other uses!



All 3 factors stand in plain sight

MARCHANT

the electric calculator with straight-line figure dials for ALL 3 FACTORS!

Save the time of high-wage personnel now figuring with pencil and paper, or with eye-straining approximating devices having uncertain decimal points. A MARCHANT gives "the answer" quicker . . . correctly pointed off . . . and with *all 3* factors in plain sight for checking.

This is why MARCHANT is so popular in shop and field . . . and explains why more and more firms are putting one within convenient reach of each desk.

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☐ *Send* Feature Analysis Folder. ENR 8-27-42

☐ *Send* "7 Place Natural Trig. Functions with Increments to Seconds," with supplemental Sine-Arc and Sine-Cosine tables. (*25 cents in stamps enclosed*).

☐ *Send* "Simplified Sq. Root Method."

☐ *Send pamphlet* "Earthwork End-Areas, Volumes, and Mass Diagrams."

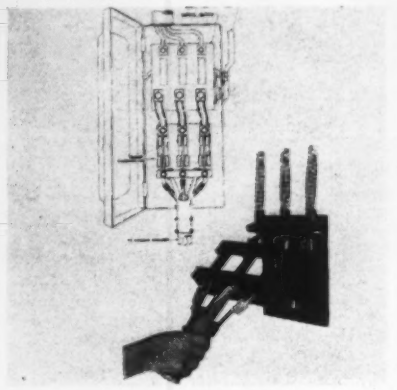
Firm _____

Individual _____

Address _____

Use margin of page if necessary

36 in. by 72 in. Lifting speed is approximately 30 ft. per minute.—*Lewis-Shepard Sales Corp., 245 Walnut St., Watertown, Mass.*



Disconnector

Many building contractors have simplified the process of handling 3 or 4 welding machines and heavy cables running down to a source of current by mounting them on a single frame with only one cable running to a safety switch. However, when the work is moved, the cable must be disconnected and reconnected, and for this purpose the Burndy disconnector has been developed. The disconnector is mounted inside the box of a safety switch and arranged so that the cover cannot be opened unless the switch is in the open position. Connecting and disconnecting are accomplished by a simple series of steps said to be foolproof and very fast.—*Burndy Engineering Co., Inc., 459 East 133rd St., New York, N. Y.*

Paint in Paper Cans

Paper paint cans are the latest contribution of the Sherwin-Williams Co. to the war conservation drive. The top and bottom of the new container, which is the result of several months of experimentation, are metal discs, but the body is made entirely of cardboard impregnated with an insoluble substance. No tin at all is required.—*The Sherwin-Williams Co., Cleveland, Ohio.*

Safety Blasting Plug

The recent invention of a blasting accessory, the Heitzman safety blasting plug, provides those engaged in blasting work with a cheap, economical but highly efficient sealing device for drill holes. The device consists of an asbestos cup and a tapered wedge. The wedge, when driven into the cup with the loading pole, produces the expansion of the asbestos cup so that the drill hole is filled and sealed air tight directly above the powder charge. The plugs are said to be particularly adapted to difficult blasting.

Dig, Haul, Dump

in one operation!

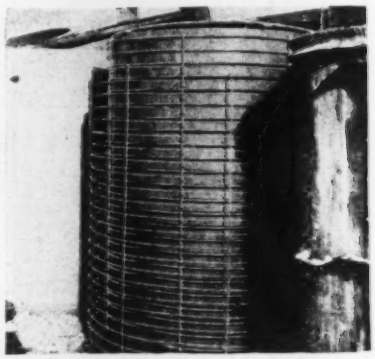
On jobs where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway is a great money-saver because it will dig, haul and place the materials without the help of other equipment.

First cost of a SAUERMAN machine is reasonable, maintenance expense is small, and the simplicity of operation permits easy one-man control of even the largest installation.

This equipment is very flexible and is readily adapted to meet new and difficult working conditions. Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will move as much as 1,000 tons per hour of the toughest materials.

Write for our catalog and see for yourself how others have cut costs on hundreds of dig-and-haul jobs with SAUERMAN Machines.

SAUERMAN BROS., INC.
532 S. Clinton St., Chicago



CIRCULAR REINFORCEMENT

The Toughest Test of Welded Fabric Quality

Every step in the manufacture of Clinton Welded Fabric is completed in our own plant. From blast furnace to wire, to electrical welding, it is supervised and tested by our own experts. UNIFORMITY, both in welding and in tensile strength of the wire itself, raises performance standards, and assures maximum strength at welds. Clinton Welded Fabric, the choice of experts for circular and other concrete shapes, comes in sheets or rolls, cut to your *exact* job specifications . . . saving you the time, trouble, and expense of on-the-job cutting and placing. Wickwire Spencer Steel Company, 500 Fifth Avenue, New York, N. Y.

WICKWIRE PRODUCTS

CLINTON REINFORCING FABRIC
It's Electrically Welded
WICKWIRE SPENCER

Economical-Effective Durable

SERVICISED SEWER PIPE JOINTING COMPOUNDS

HOT POURING COMPOUND . . . an inexpensive asphaltic preparation, carefully compounded into a uniform and easy-to-work-with product. A quick-setting compound, producing tough, flexible, long-lasting joint connections. Thousands of pounds of this material have been used by contractors with a high degree of satisfaction. This hot-poured compound is shipped in Fiber Containers that open very easily. Sizes 10 gals. and 55 gals.

Hot Pouring Compound

Applying Tufflex

TUFFLEX . . . a cold troweling plastic that is premixed and ready for immediate use. The adhesive qualities of this compound eliminate the possibility of foreign matter, root growth and infiltration of surface water. Tufflex is easily handled and forms a flexible joint. Ideal for special jobs. The cost is low because you profit in time-saving.

Pioneers in the manufacture of Approved Construction Materials for over twenty-two years.

PREMOULDED SEWER PIPE BELT . . . a modern product manufactured to assure watertight, root and acid resistant joints. The ends of each belt are beveled so that a perfect meeting is made for a tight joint with no leakage. This belt is calked into the annular space between bell and spigot of sewer pipes as indicated.

Be sure to send for FREE CATALOG describing our complete line of construction materials

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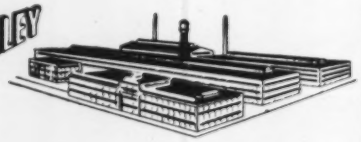
SERVICISED PRODUCTS CORP.

6051 West 65th Street, Chicago, Ill.

RIGHT DOWN OUR PRODUCTION ALLEY



We want WAR SUB-CONTRACT work!

We need work — you need help — let's get together.

Stewart has enormous manufacturing and ample shipping facilities for production runs of units or parts of units fabricated from angles, flats, tees, rounds, squares, sheets, strips, and plates involving the use of equipment listed at the right.

Stewart offers competent engineering service; on time deliveries; best workmanship and the highest financial rating obtainable. When writing, please send specifications and complete information.

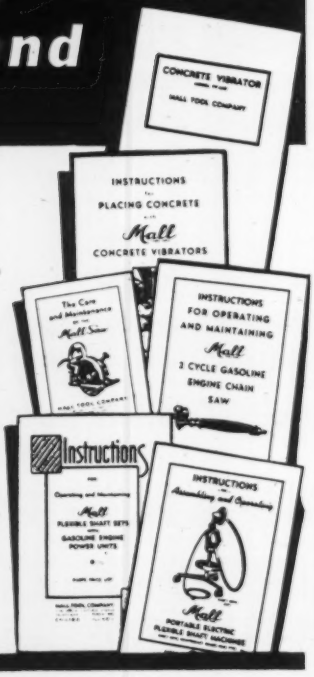
PRODUCTION FACILITIES

Punch Presses • Shears
Power Brakes • Spot, Arc and Gas Welders
Drill Presses • Bull
Dozer Forming Equipment
Automatic Saws • Heat Treating Furnaces • Finishing Equipment • Tool Room Equipment.

Stewart FABRICATORS OF IRON · STEEL · WIRE
ANGLES • FLATS • ROUNDS • SQUARES • TEES • STRIPS • SHEETS • PLATES

THE STEWART IRON WORKS CO. Inc.
1967 STEWART BLOCK
CINCINNATI, OHIO

HOW TO MAKE YOUR Mall TOOLS Last Longer and Work Better

TRADE MARK

CONCRETE VIBRATOR
MALL TOOL COMPANY
INSTRUCTIONS for PLACING CONCRETE with Mall CONCRETE VIBRATORS
INSTRUCTIONS FOR OPERATING AND MAINTAINING Mall 2 CYCLE GASOLINE ENGINE CHAIN SAW
Instructions
INSTRUCTIONS Assembling and Operating
Mall PORTABLE ELECTRIC FLEXIBLE SHAFT MACHINE

FREE INSTRUCTION MANUALS are yours for the asking.

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Mall Instruction Manuals complete with easy-to-understand diagrams and practical suggestions covering the operation and maintenance of Mall Tools are available for Mall Concrete Vibrators, Concrete Surfacers, Portable Electric MallSaws and Drills, Door Mortisers, Door and Surface Planes, Flexible Shaft Grinders and Polishers, as well as Chain Saws.

In addition, factory-trained representatives in principal cities are waiting to service your tools. A minor adjustment today may save a major repair job tomorrow and conserve critical materials for War Production.

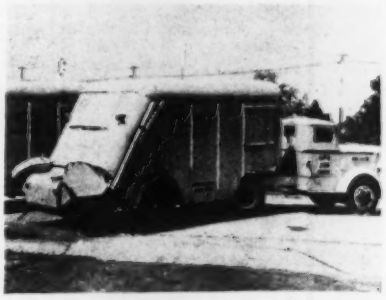
Write AT ONCE for your FREE copies of Mall Instruction Manuals giving the serial number of your Mall Tools. Name of Mall Service Base nearest you will be furnished upon request.

MALL TOOL COMPANY
7730 South Chicago Ave. Chicago, Ill.

They can be used in drill holes of any direction from straight down to directly overhead. The plugs are light in weight and not bulky or cumbersome to handle. —*The Heitzman Safety Blasting Plug Corp., Shamokin, Pa.*

Mobilcrane

The new Osgood 805WM Mobilcrane has been announced. All operating functions of the machine are controlled by air power. Independent travel, independent boom hoist, extra wide chassis, 18 rubber tired wheels, hydraulic steering and air brakes are advanced features that are said to give the Mobilcrane the ability to get the job done quickly, efficiently and economically. The extra width of the chassis and the use of 18 wheels makes it possible to lift loads up to 30 tons over the side of the machine as well as the ends, and carry the load to the desired location.—*The Osgood Co., Marion, Ohio.*



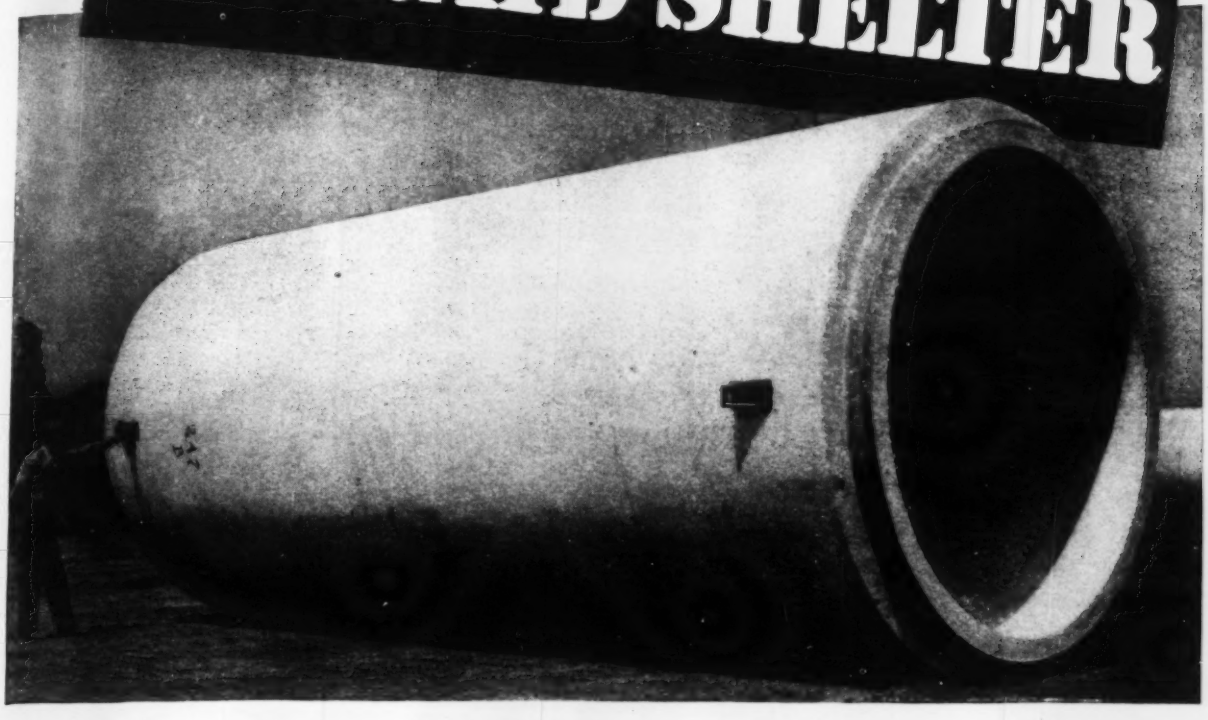
Garbage Trailer

Recently installed by the city of Milwaukee are these conveyor type garbage trailers, said to be the only such models in use in the United States. The city officials say that the use of trailers makes it possible to use the power equipment for other uses when the garbage trailers are not required. The units not only save fuel but also do not tie up motorized equipment when not in use.—*The City of Milwaukee, Wis.*

Protective Oil

Announcement has been made by the Chemical Development Laboratory of the Curran Corp., of a light "Polar K" oil claimed to have the unique and valuable properties of completely removing perspiration, water, oil and dirt from steel surfaces. The new oil is said to be superior to alcohol for dehydrating and cleaning steel surfaces, bearings or similar parts which have become wet or have been left with a film of grinding emulsion. The new oil instantly displaces and absorbs water and leaves a thin film of "Polar" type lubricant and rust preventive, said to be especially applicable for protection during storage.—*The Curran Corp., Malden, Mass.*

AIR RAID SHELTER



. . for your water supply

Natural enemy target would be the water supply line of a sighted community. Against the threat of air attack or sabotage—your safest shelter lies in steel-reinforced concrete.

Lock Joint Pipe can take it! Its underlying strength rests in the solid toughness of its dense concrete walls—in its cylindrical steel skeleton ribbed with bars of steel—in the flexibility of its self-caulking joints. Each unit of a Lock Joint Pressure line is a thick-walled bulwark of defense against terrific vibration and shock. Nor are those sub-surface enemies, corrosion and tuberculation, able to successfully attack the hydraulic efficiency of a Lock Joint supply line. Never—in the 37 years of our history, in all the lengths of our pipe lying throughout the world—has there been a failure. Construction and design make Lock Joint Pipe your safest, surest investment today—yet Lock Joint Pipe uses less of those essential materials so necessary to our War effort. Whether your project is large or small, play safe with Lock Joint Reinforced Concrete Pressure Pipe. Your 'phone call, telegram, cable or letter to any of our offices will bring an immediate response.

LOCK JOINT PIPE COMPANY

Established 1905

AMPERE, NEW JERSEY

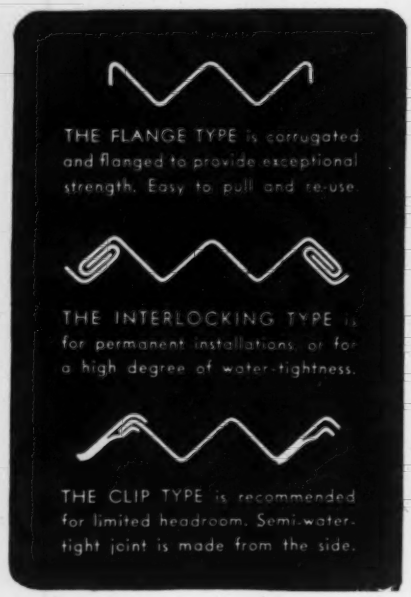
Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo.
Rock Island, Ill. • White Plains, N. Y. • Valley Park, Mo.
Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES

Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

THIS SHEETING *Saves Metal* FOR WAR


THE FLANGE TYPE is corrugated and flanged to provide exceptional strength. Easy to pull and re-use.
THE INTERLOCKING TYPE is for permanent installations, or for a high degree of water-tightness.
THE CLIP TYPE is recommended for limited headroom. Semi-water-tight joint is made from the side.

Saving vital materials is a wartime *must*. Even on important war construction, where there is no suitable substitute for steel sheeting and sheet piling, you can help conserve metal. Do it by using the proper type of ARMCO Sheeting.

With ARMCO Sheeting you specify the exact gage for the job and thus eliminate excess weight. Ample strength and light weight make for easy handling and installation. ARMCO Sheeting drives fast because of its comparatively small displacement area. The work is speeded. You need less sheeting on temporary jobs since it is readily pulled and can be used again and again.

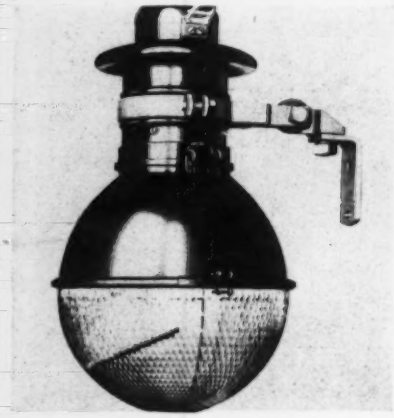
Consider ARMCO Sheeting wherever important war construction demands the use of metal sheeting. Select the type that best meets your needs and you'll save metal, time and money. Armco Drainage Products Assn., 485 Curtis St., Middletown, O.

ARMCO

ARMCO SHEETING

Receptacles

The Wiremold Co. has announced development of two new receptacles for installation in Wiremold No. 2100 "Plugmold." The No. 2127P is a three-wire polarized receptacle especially adapted for those installations where a solid ground is required for small tool motors. The No. 2127S Universal type receptacle is designed to take plugs with either parallel or tandem blades.—*The Wiremold Co., Hartford, Conn.*



Protective lighting

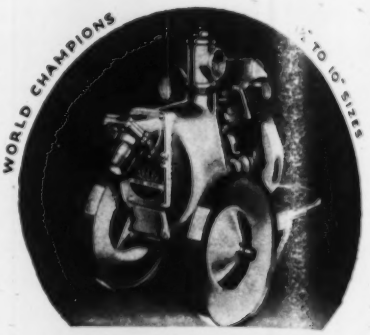
Two new protective lighting brackets have been announced by the Line Material Co., designed for pole mounting of protective lighting luminaires where vertical and horizontal adjustments are required—particularly in the case of fence lighting with Fresnel lens type luminaire. The pendant type bracket shown above is available for inner and outer wiring. It will accommodate both the L-M Fresnel luminaire and the L-M Prismalite luminaire. The clamp around type bracket will accommodate both these items in combination with the L-M Clampolite wet process procelain head. —*Line Material Co., Milwaukee, Wis.*

Flashings

For safe, leakproof repairs to worn-out flashings, a new method has been devised to take the place of lead or copper. Said to be inexpensive in application, requiring no skill, materials are furnished by the Flexrock Co.—*Flexrock Co., Philadelphia, Pa.*

New Welded Trailer

To aid in conserving rubber for direct war needs, Harnischfeger Corp. has announced the immediate substitution of an all-steel wheel portable mounting on its P&H gas engine-driven welders for the rubber-tired trailer. The new trailer is of the two-wheel type, equipped with an axle and heavy duty springs, and



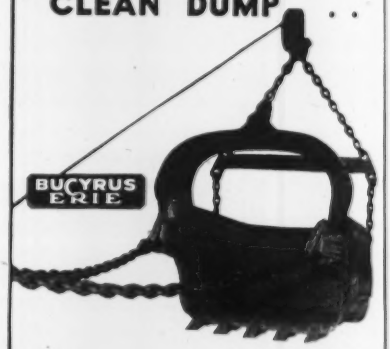
Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET** — Up to 5 times faster prime and re-prime — no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF** — controlled by flow, not pressure.
- **LONG-LIFE SEAL** — Accessible for inspection.
- **PATENTED SELF-CLEANING SHELL**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES** — 3,000 to 220,000 g.p.h.

Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO
200 Dublin Ave., Columbus, Ohio

QUICK FILL . . . . .
SMOOTH CARRY .
CLEAN DUMP . .



That's why RED ARCH Buckets will give you faster dragline operation, bigger output to meet wartime demands. These modern buckets add to your production because they are:

1. Scientifically designed on the basis of 62 years' experience. 2. Manufactured from tough, light special alloy-steels. 3. Fitted with famous Beco Tiger Teeth—easily replaceable, reversible and renewable. 4. Equipped with the new, strong, butt welded Red Arch chain.

Capacities from ⅜ to 14-yards; light, medium and heavy duty types. Step up your output with Red Arch Buckets!

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WIS., U. S. A.

MORE TRIPS PER HOUR

Shuttle operation on narrow haul roads saves turning time. Koehring Dumptors travel forward or reverse at same speeds ...are spotted easily and close to loading unit . . . *SAVING SECONDS EVERY TRIP.* Rock or dirt is loaded, hauled and dumped at speeds which cut seconds from every operation. Seconds saved every trip, increase trips per hour . . . yardage per shift. Koehring Dumptors have the war speed so vital today for essential military construction projects.

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MILWAUKEE • WISCONSIN

Instantaneous Dumping

DUMPTORS DUMP ROCK OR DIRT INSTANTANEOUSLY SAVING SECONDS EVERY TRIP . . . INCREASING TRIPS PER HOUR.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

SIMPLE..FAST..ECONOMICAL

NELSON SPREADER TIES!

For Spacing and Tying Concrete Forms

TODAY, when you are working against time on every job, Nelson Spreader Ties are helping to set new records in the construction of concrete forms. These Patented Ties, with sturdy, corrugated-angle design have a working load of 1,500 lbs. and are made of 1¼" 15 gauge cold rolled strip steel. Sizes for any wall or beam width. Packed 100 to bundle. Average spacing 4 sq. ft. per Tie. No walers required, just place Ties between boards when erecting forms, then nail twisted ends to studding. After stripping forms, Tie ends are easily twisted or cut off. If you want to expedite that rush job—

Write, wire or phone for complete details

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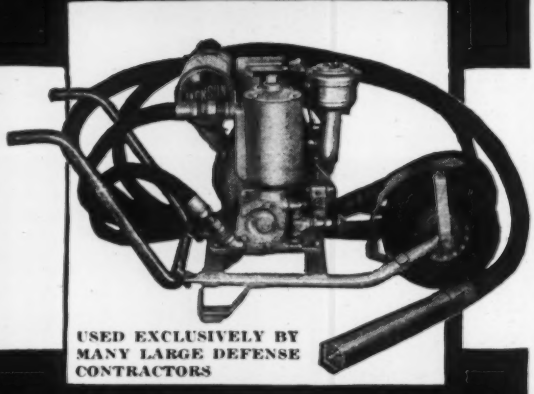
530 SECOND STREET S. E. MINNEAPOLIS, MINNESOTA

. . . If you want to make speed profitably . . . GET DEPENDABLE EQUIPMENT *. . Buy the Fast . . .*

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY

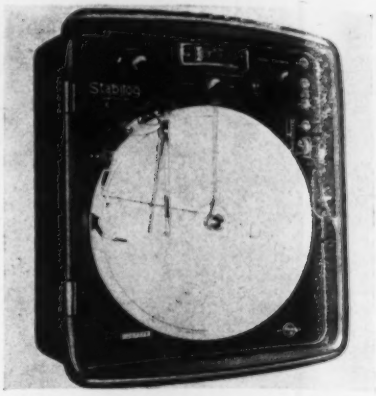
- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.



USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

suitable for field work and highway towing.—*Harnischfeger Corp., Milwaukee, Wis.*



Control

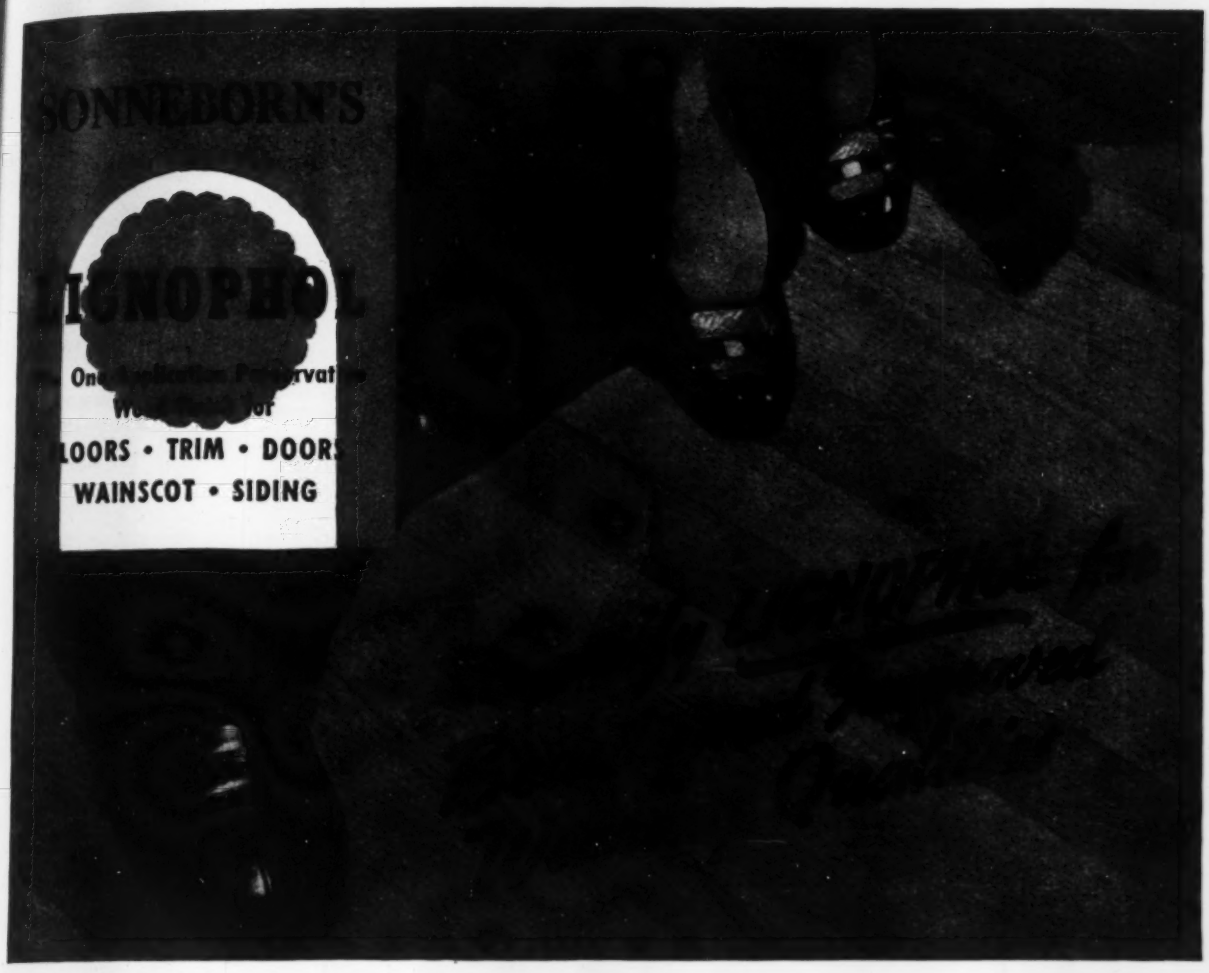
A new development said to be of unusual importance in the field of control engineering has been announced by the Foxboro Co., under the name of Hyper-Reset. Hyper-Reset is not an instrument or a mechanism, but a control function, available in the newly-designed Model 30 Stabilog Controller, for application where process-lag is considerable. Its importance is said to be demonstrated by tests in which Hyper-Reset consistently re-established process stabilization, following an upset, in a quarter of the time and with only one-half the upset effect, as compared with a similar controller having only the usual reset.—*The Foxboro Co., Foxboro, Mass.*

Ventilators

A new series of war plant ventilators for blackout has been announced by the Carrier Corp. Designed to prevent transmission and reflection of illumination from the building interior or the reflection of light from the night sky, the war-plant ventilators are available in three types: Carrier exhaust ventilators, supply ventilators, and temperating ventilators. Each of the types described comes in three standard capacities—10,000, 15,000 and 20,000 cfs. The units may be used singly or in multiple.—*The Carrier Corp., Syracuse, N. Y.*

Oil Absorbent

A completely new type of fireproof and skid-preventing oil absorbent is now available through Waverly Petroleum Products Co.'s fire defense department. Called "Speedi-Dri," it is a granular substance with such tremendous affinity for oil and grease that its regular use draws old stains from floors, as well as removing new accumulations.—*Waverly Petroleum Products Co., Drexel Bldg., Philadelphia, Pa.*



LIGNOPHOL is no ordinary surface finish, but a beautifying and preservative treatment that penetrates into the wood, depositing toughening resins and life-imparting oils which resist moisture, molds, fungi and wood destroying organisms.

Unlike many finishes, Lignophol enhances rather than obscures the natural beauty of the wood. Because of its protective penetration, Lignophol stands up exceptionally well under the severest use in schools, institutions, offices and factories. In homes, it provides lastingly beautiful floors, trim and paneling far beyond the expected service of surface-type finishes.

Lignophol assures substantial economies in time and labor because only a single application is required in order to obtain its full benefits.

Lignophol is available in light brown, medium brown and natural shades to harmonize with the widely used woods for floors, trim and paneling.

Write today for the new Architect's folder giving complete specifications, and factual data based on Lignophol's performance for more than 25 years.

Where Results Count—Count on Sonneborn

L. SONNEBORN SONS, Inc.

88 LEXINGTON AVENUE NEW YORK, N. Y.

★ Picture shows Warrington-Vulcan Single Acting Pile Hammer driving reinforced concrete piles 20"x24"x72 feet long from floating derrick for harbor wall. The longest piles driven on this job were 93 feet long. Sizes, 0—1—2—3—4. The SUPER-VULCAN Differential-Acting Open-Type Pile Hammer fits the same leads and uses the same accessories as the Warrington-Vulcan. Sizes 80c, 50c, 30c, 18c.

Added speed in construction is vital today—get it with VULCAN—there are types and sizes for every need—for underwater work use Super-VULCAN Differential-Acting Closed-Type Steam Pile Hammers—for removing old piles of all kinds quickly, use the VULCAN Pile Extractor. We are the largest exclusive manufacturers of pile driving and extracting machinery since 1852. Write for bulletins.

VULCAN IRON WORKS Since 1852

331 North Bell Avenue

Chicago Illinois

NEW PUBLICATIONS

Locomotives—A new bulletin describing diesel electric locomotives for industrial switching produced by General Electric Co. has just been released. Well illustrated with drawings and photographs, the booklet describes locomotives which are powered by two Cummins HB1S-600 diesel engines, nominal rating of 200 hp. at 1800 rpm each. Shown are various uses of the engines and details of construction.—*General Electric Co., Schenectady, N. Y.*

Mobilization—An 18-page illustrated booklet on kva demand metering, explaining how it can be used to get most out of existing generating and distribution facilities, is announced by Westinghouse Electric & Mfg. Co. Power factor correction is one of the important means of increasing effective use of existing generating and distribution facilities. Any power supply, polyphase or single phase, local or remote, single circuit or totalized, can be accurately metered on a kva demand basis. The booklet outlines the most recent developments in kva demand metering and explains several applications. Graphs and line diagrams show the accuracy and practicability of the various types of kva meters.—*Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*

Heating—A 24 page manual, dedicated to users of equipment who want the continued benefits of air conditioning, refrigerating and heating systems, has been issued by the Carrier Corp. Entitled "Civilian Conservation of the B.T.U.," the booklet is published in recognition of the wartime shortage of available service engineers and to serve as a handy reference for simple care of equipment.—*The Carrier Corp., Syracuse, N. Y.*

Plastics—A new booklet on the use of extruded industrial plastics in war production has been issued by the R. D. Werner Co. It was prepared for use of government offices and war contractors. Inasmuch as there is a great deal of material in the booklet concerning new and diverse applications for plastics in a wide variety of fields, it is felt to be valuable to the engineering and contracting professions.—*R. D. Werner Co., Inc., 380 Second Ave., New York, N. Y.*

Heat Transfer—Processing equipment is rarely designed without careful consideration of the overall heat transfer rates that may be anticipated as a result of conductivity through metal walls. Since the thermal conductivities of the metals used in the fabrication of steam

For Immediate Delivery

MASTER 4C ELECTRIC-CONCRETE VIBRATOR

Speeds of 4500; 5500; 7200 R.P.M. ALL Speeds rated at FULL LOAD. Low Maintenance. Ruggedly Built

Master Electric-Concrete Vibrators are available in sizes, ½ HP to 3 HP any standard voltage either AC or DC current. Electric power not being available master Gas-Electric Portable Generator Plant will solve your power problem.

MANUFACTURERS OF

- Gas-Electric Generator Plants 500 Watts to 9400 watts—AC or DC.
- "Big-3" Gas-Electric Power Units for Electric Generation, Concrete Vibration & Tool Operation.
- Concrete Vibrators—Gas or Electric.
- Concrete Surfacing Attachments.
- Master Power Blow Hammers & Tools.
- Complete line of High Speed Tools.

Master Distributors throughout United States and Canada. All Foreign territories—Armco International Corporation.

Send for #505 Equipment Bulletin Today

Master Vibrator Co., Dayton, Ohio

Compact! Powerful! Safe!

DISTRIBUTABLE CONTROLLED POWER

with Beebe Bros. ALL STEEL HAND HOIST SEATTLE, U.S.A.

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Money Has Been Saved on These Jobs

1200' assembled pipe (132 Tons) were lowered to bed of Mississippi at St. Paul with 9—5-Ton Beebes, three lines to each hoist through blocks.

Hudson River Bridge sidewalks were laid in sections with 32—5-Ton Beebes.

Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

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When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

BEEBE BROS., 2720 6th Ave. S., Seattle, U.S.A.

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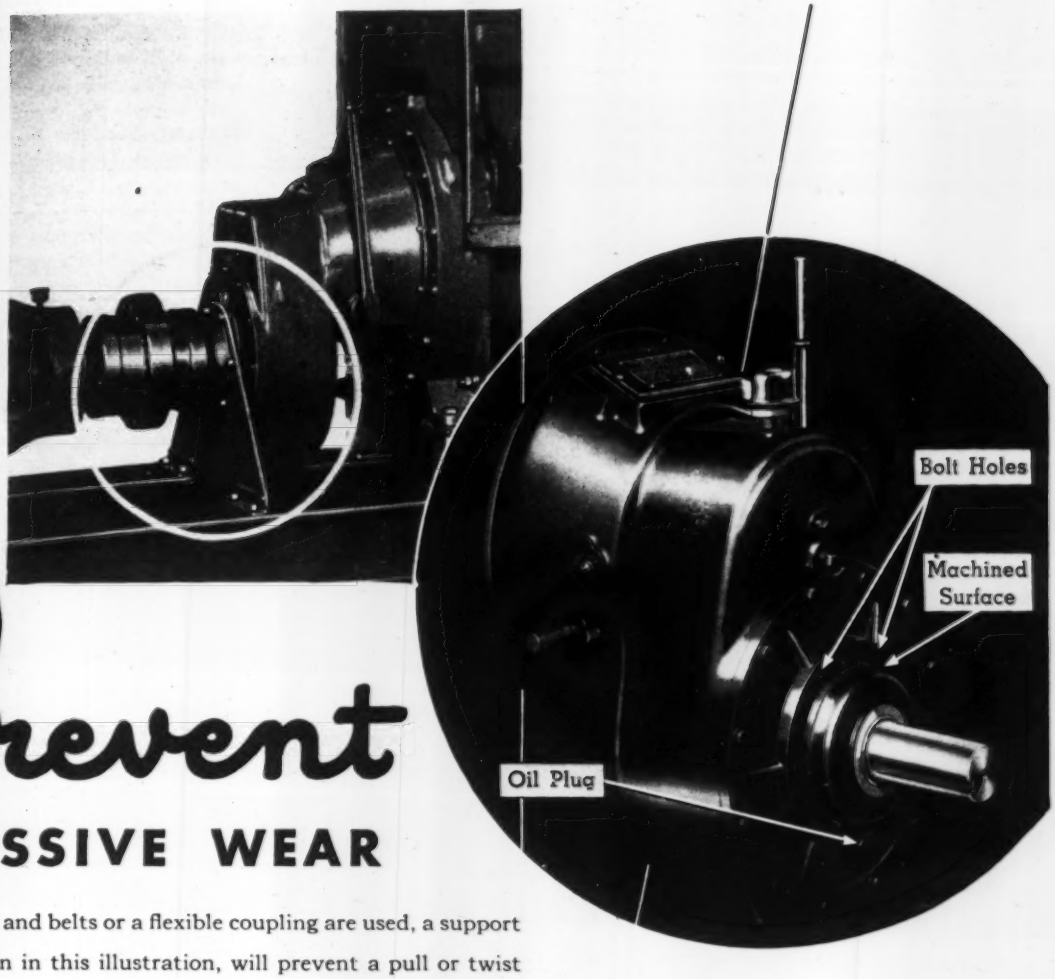
"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"



Prevent

EXCESSIVE WEAR

Where pulleys and belts or a flexible coupling are used, a support plate, as shown in this illustration, will prevent a pull or twist when heavy side loads are applied. It will assure positive alignment and increase the working life of gears and bearings.

Note that the support consists of a steel plate, cut to fit. The weight of the steel plate should be in proportion to the size of the reduction gear and the maximum load which is to be applied.

Bolt or weld the plate to the engine's sub-base or mounting; carefully align, using shims if necessary, to assure correct adjustment.

For full instructions, see your engine representative, your Twin Disc dealer or write direct to the Twin Disc Clutch Company, Racine, Wisconsin, for Service Bulletin SB-113.

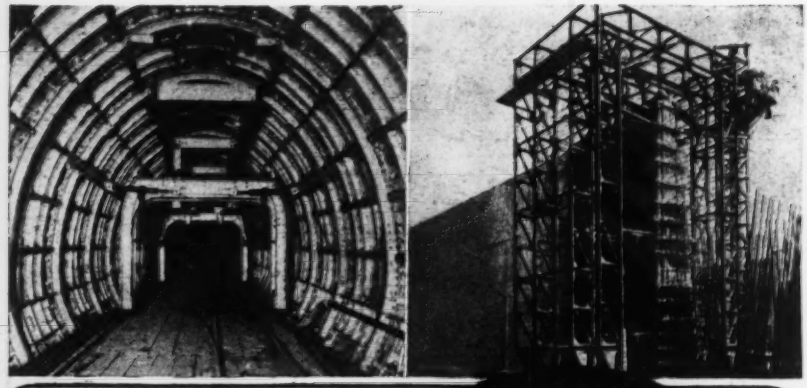
Illustration at top left shows the CORRECT *installation of a gusset or support plate to* PREVENT *misalignment and undue wear of gears, shaft and bearings, when using a Twin Disc Reduction Gear.*

1. *Machine the plate to fit snugly against the machined surface of the case.*
2. *Drill holes in the plate to match those already drilled and tapped on the machined surface of the reduction gear.*
3. *Allow a hole or groove in the plate to clear the oil plug.*

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

TWIN DISC CLUTCH CO.

Racine, Wis.



for Economy in Construction

BLAW-KNOX STEEL FORM Engineers offer a consultation service before plans are drawn, with the thought in mind that their specialized knowledge and experience may be of assistance to both engineers and contractors in promoting speed and economy in construction, and securing a superior quality of finished work.

This engineering service is yours for the asking.

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—and easy-to-learn and amusing!

That is the purpose, completely realized, of this new mathematics text. The authors begin (with a humorous story) right on the edge of the Unknown where arithmetic can no longer show the way. After a thorough course in algebra they take you on a survey of the highlights of trigonometry, analytic geometry, more advanced algebra, and calculus, with a seasoning touch of the theory of numbers. The style is light, the explanations are detailed and the book makes highly interesting reading.

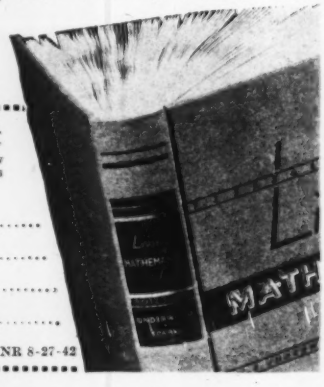
LIVING MATHEMATICS

By R. S. Underwood and Fred. W. Sparks
Texas Technological College

365 pages, 6x9, $3.00

HERE is just the book for - - those who have met with initial failure in trying to master the intricacies of the subject; and now, as adults, can be expected to make real headway when the subject is presented as a fascinating pastime - - those who 'took to it' readily when first presented; and now wish to pick up the threads and go on to higher mathematics, — the calculus and number theory.

In this book you will find drama, zest, humor, surprise, challenge and human interest.



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chests, condensers, and jacketed units are of themselves poor indices of what actually can be expected, much more information is desirable. A 16-page booklet from data prepared in the Development & Research Division of the International Nickel Co. includes information in formulae for determining mean all heat transfer rates, the various factors influencing heat transfer through metallic walls, and the thermal conductivities of metals and alloys commonly used in construction of process equipment. *The International Nickel Co., Inc., 67 Wall St., New York, N. Y.*

Safety—Safety Digest is the title of a new 56-page book on industrial accident prevention released by American Mutual Liability Insurance Co. Comprising ten articles previously published in the American Mutual Magazine, each of which has been selected for its special application to industrial wartime safety needs, Safety Digest provides much needed help in preventing accidents and damage.—*Publicity Department, American Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass.*

Industrial Flooring—"The Secret of Laying a Heavy Duty Industrial Floor" is a small booklet issued by the Washington Concrete Co. The publication deals with the subject of meeting present day demands, necessary characteristics for an industrial heavy duty floor, and other matters involved.—*Washington Concrete Co., Empire State Building, New York, N. Y.*

Welding—A new 14-page "fight waste" bulletin "Make 3 do the work of 4." has just been issued by Air Reduction Sales Co. The booklet, which consists of a series of shop posters, is designed to help arc welding operators do more useful work with every electrode. Each poster of the six shown illustrates a common wasteful practice, then shows the corresponding good practice and points out the ease and simplicity of doing the job the right way.—*Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.*

Tin—The current issue of "Tin and Its Uses" published by the Tin Research Institute is devoted to emergency economies in tin. It is explained that although in normal times the Institute's purpose is to develop new and improved uses for tin, this would be useless at the present time. During the period of scarcity, the Institute offers its services in the solution of tin economy problems. Accordingly, this issue of the booklet describes practical methods of saving tin in various fields of use.—*Tin Research Institute, Battelle Memorial Institute, 595 King Ave., Columbus, Ohio.*

Manufacturers' Activities

G. A. Bassett, newly elected president of Gar Wood Industries, Inc., of Detroit, in a recent review of the company's activities, stressed the fact that war and industry are inseparable. "War consumes tremendous quantities of materials far beyond the comprehension of the human mind," Mr. Bassett said. "Part of the gigantic task of winning lies with industry—for industry must apply these vital materials and equipment."

John K. Colgate has been named a vice president of the Tyson Roller Bearing Corp., in charge of the ballbearing division. The department will be housed in a new plant now nearing completion at Massillon, Ohio.

Max W. Babb, chairman of the board of the Allis-Chalmers Mfg. Co., is among those participating in the work of the American Industries Salvage Committee to enlist the full cooperation of individual industrial concerns behind the current scrap salvage program. Mr. Babb is serving as liaison agent between the committee and individual companies in the machinery industry.

Paul L. Hexter, vice president of the Arco Co. in charge of development of infra-red reflecting camouflage paints and paint-mixing machines, has been commissioned a captain in the Army air forces.

John E. Muirhead has been appointed assistant to the president of the International-Stacey Corp., with headquarters at Columbus, Ohio.

To increase service to diesel engine users in the oil fields, and because of the growing number of manufacturers using the equipment to power their plants, the Cummins Engine Co. has enlarged its regional office at Fort Worth. J. B. Chambers, regional manager, will be in a better position to facilitate the handling of all sales and service matters from his new office at 1812 Fair Building, Fort Worth.

Use R B & W Bolts and Nuts . . .

Quick-starting, quick-tightening because they are accurately, uniformly sized and threaded — and carefully inspected.

Vibration-resisting, shock-resisting because the manufacturing method insures extra strength, and all processing is controlled from raw rod to finished product.

EMPIRE BOLTS-RIVETS

AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

RB&W *Making strong the things that make America strong*

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.
Sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle

You can depend upon the greedy jaws of Industrial Brownhoist clamshell buckets to speed up your material handling. Their deep clean bites practically eliminate hand shoveling. Fast opening and closing action. Extra sturdy. Minimum rope wear and maintenance. Standard types (rope-reeve, power-wheel, link-type) in stock for immediate delivery. Write for information.

INDUSTRIAL BROWNHOIST

BAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

This is where Yehudi lives

• It's the thermostatic control on our oil-fired kettles . . . and it maintains constant temperatures in the all-important zinc bath.

It's just one of the aids to human skill that speed our work and insure its uniform quality. It's another reason why Enterprise Galvanizing Company can be depended upon to meet the most exacting specifications.

ENTERPRISE GALVANIZING COMPANY

2500 E. CUMBERLAND ST., PHILADELPHIA, PA.

"To Economize—Galvanize at Enterprise!"

SPEED SPEED SPEED!

WITH VIBER VIBRATION

Viber Vibrators are being used on wartime construction because they mean better concrete faster! No matter what type of concrete work you do, there is a type of Viber Vibrator made for that type of work. Interchangeable equipment, for gas, electric and air-operation, still further reduces costs.

NEW FEATURES "GAS" VIBRATOR

Mercury clutch, entirely automatic, picks up load at 1500 r.p.m. allowing engine to idle without running vibrator, eliminates stalling, makes starting easy in cold weather.

Upsetting is practically eliminated in mounting. Handles allow complete unit to be easily carried.

• **NEW CATALOG** describing new line of modern Viber Vibrators sent on request. Write for it today.

VIBER COMPANY

726 SO. FLOWER STREET

BURBANK, CALIFORNIA

W. G. DARLEY, of GENERAL ELECTRIC'S Nela Park Institute, will supervise judging of candidates' applications for membership in a "club" dedicated to the elimination of lighting bottlenecks in the war production program. Silver and gold lapel pins, in the shape of bombers, will be awarded to men who qualify as having aided the war effort by their efforts to eliminate such lighting troubles.

RALPH C. STUART has been named manager of manufacturing to supervise production at five plants of the lamp division of the WESTINGHOUSE ELECTRIC & MFG. CO., of Bloomfield, N. J. In his new post, Mr. Stuart will be in charge of the manufacture of all incandescent and fluorescent lamps made by Westinghouse.

MEN AND JOBS

Warren H. Booker, director of the division of sanitary engineering for the North Carolina state board of health, has been appointed coordinator of public water supplies and sanitation in the state's civilian defense setup.

Earl Schueth, designer with the South Dakota state highway bridge department since 1936, has been given a leave of absence to serve as a first lieutenant with the U. S. Army.

Lt. Comdr. Madison Nichols, in charge of construction of a barracks near Jacksonville, N. C., has been transferred to Galveston, Tex.

Willis Walker, district engineer with the South Dakota state highway commission since 1939, has accepted a commission as a first lieutenant in the U. S. Army.

Tom Bradley, city engineer of Paducah, Ky., has accepted a leave of absence to do war work. His brother, **Leon W. Bradley,** chief draftsman for the city engineering department, also will enter the army soon.

John F. Long, until recently working on flood control in the Houston, Texas, office of the U. S. Engineers, is now in the Louisville District Office of the same organization, where he is employed in the specifications section for housing, hospitals, cantonments, depots and utilities. Mr. Long previously was stationed at Rock Island, Ill.

MEETINGS

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION OF AMERICA, Meeting to be held at Hotel Sherman, Chicago instead of Stevens Hotel, Sept. 15–17.

AMERICAN WELDING SOCIETY, 23rd annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 12–15.

AMERICAN SOCIETY OF CIVIL ENGINEERS, Fall Meeting, jointly with the Engineering Institute of Canada, Hotel General Brock, Niagara Falls, Ontario, Oct. 14–15.

NATIONAL RECLAMATION ASSOCIATION, Denver, Colo., Oct. 14–16.

AMERICAN PUBLIC WORKS ASSOCIATION, Cleveland, Ohio, Oct. 18–21.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION, Meeting to be held at Hotel Sherman instead of Stevens Hotel, Oct. 20–22.

NATIONAL SAFETY COUNCIL, 31st National Safety Congress and Exposition. Chicago. Hotel Sherman, La Salle and the Morrison. Convention headquarters in the Sherman. Oct. 27–29.

AMERICAN PUBLIC HEALTH ASSOCIATION, St. Louis, Mo., Oct. 27–30.

FEDERATION OF SEWAGE WORKS ASSOCIATIONS, 3rd annual convention, Hotel Statler, Cleveland, Ohio, Oct. 22–24.

INSTITUTE OF TRAFFIC ENGINEERING, Sherman Hotel, Chicago, Ill., Oct. 25–27.

REGIONAL AND LOCAL MEETINGS

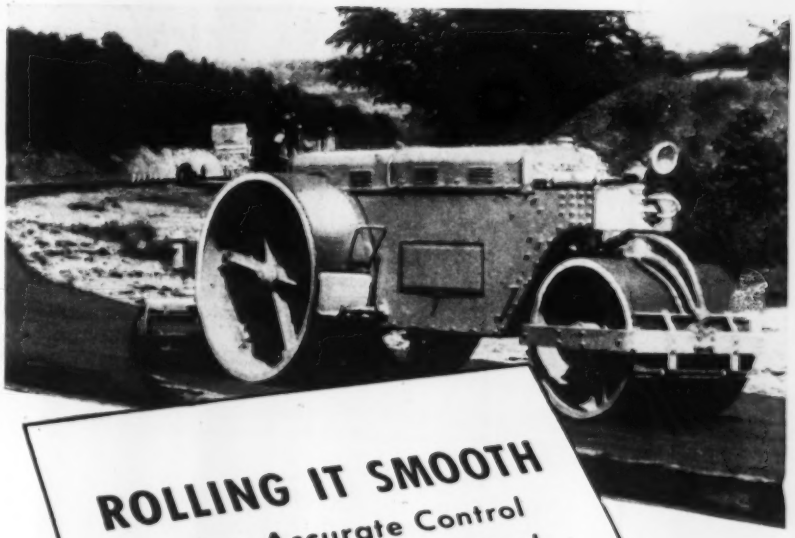
NEW ENGLAND WATER WORKS ASSOCIATION, Annual Meeting, Hotel Statler, Boston, Mass., Sept. 15–16.

NORTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE, annual meeting, Great Northern Hotel, Williston, N. D., Sept. 21–23.

SOUTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE, 8th annual meeting, Huron, S. D., Sept. 28–29.

AMERICAN WATERWORKS ASSOCIATION, California Section, 23rd annual convention (War Conference), Oakland Hotel, Oakland, Calif.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA, Third Annual Water Conference, Wm. Penn Hotel, Pittsburgh, Pa. Nov. 9–10.



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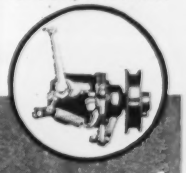

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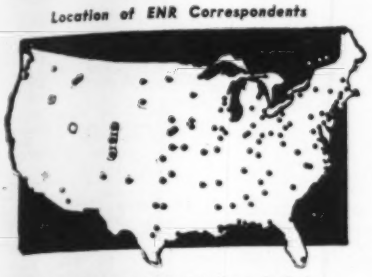
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents



Symbols and Abbreviations Include

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect — Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply — Unclassified
Sewers, Waste Disposal — Latin America
Bridges, Grade Cross'gs — Public Buildings
Streets & Roads — Commercial Buildings
Earthwork, Waterways — Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

D. C., Wash. — District Comrs., District Bldg., rejected bid July 14, 30 in. watermain, 18 St. to Minn. Ave. to Firth and Sterling Aves. CD 7/16—ENR 7/23.

Kan., Hiawatha—Reservoir and filter plant. $375,000. Black & Veatch, Broadway, Kansas City, engrs.

†**Md., Dundalk**—Federal Works Agency, 606 State Planters Bank Bldg., Richmond, Va., WW sys. exten. $16,000.

†**Mass., Attleboro** — Water Dpt., City Hall, watermain, Mass. 19-161, $15,000. **FWA.**

†**Miss., Jackson**—City, waterworks imprvs., expan. $257,000. **FWA.**

N. C., Wilmington—Water pump. station, filter plant. J. N. Pease & Co., Johnston Bldg., Charlotte, archts. and engrs.

O., Canton—24 in. test well. Sippo (northwest) water field, $20,000. J. A. Shisler, Canton, engr.

O., Galion—Well drilling, reservoir, $200,000.

Okla., Altus—T. O. Burch, mayor, water facilities. $98,500. Applied for FWA funds. Hudgins-Cobb & Thompson, Altus, engrs.

†**Ore., Pendleton**—City, filtration plant, 3 m.g. storage reservoir. $360,000. **FWA.** CD 4/1—ENR 4/9.

Pa., Phila.—P. Wks. Dpt., City Hall, 2 watermains at N.E. Phila. (1) 16 in. main from Welsh to Southampton Rd. (2) 12 in. line Welsh Rd. and Grant Ave. from Bustleton Ave. to Krewstown Rd. $146,911.

★†**Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, rejected bids Aug. 14, 7,000 ft. waterline. Less than $1,000,000.

Texas—U. S. Engineer, Fort Sam Houston, bids soon rein.-con. ground storage reservoir, Spec. 42-306 in part. $80,000. Plans deposit $25.

†**Texas**—U. S. Eng., Albuquerque, N. M., water distr. lines, facilities, $15,000; sanitary sewerage sys., $25,000; natural gas lines, facilities, $25,000.

†**Texas**— U. S. Eng., 231 W. Main St., Denison, WW and sanitary sewerage sys. Freese & Nichols, Capps Bldg., Fort Worth, archts. and engrs.

†**Tex., Garland**—City, R. Olinger, mayor, rejected bids Aug. 14, water distr. sys., Spec. 41-460. CD 3/24 under LB.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, water distr. sys.

†**Pacific Northwest**—U. S. Eng., 800 3 Ave., Seattle, Wash., temporary water supply and storage sys., Proj. 121.

†**Pacific Northwest**—U. S. Eng., 800 3 Ave., Seattle, Wash., water supply well, Proj. 117.

BIDS ASKED

Bids Asked August 31

†**Mass., East Longmeadow**—Federal Works Agency, 99 Chauncy St., Boston, 13,000 ft. 12 in. watermains. Mass 19-168. CD 8/12—ENR 8/20.

Bids Asked September 10

Pa., Wilkes Barre—Scranton-Spring Brook Service Co., 30 N. Franklin St., Wilkes Barre, Pa., repairing dam. T. H. Wiggin, 90 Broad St., New York, N. Y., engr., adv. ENR 8/27.

LOW BIDDERS

†California—U. S. Eng., Wright Bldg., Sacramento, Aug. 12, waste water and electric distr. sys., Inv. 154, from Harvey H. Holland, 1715 P St., Sacramento, under **$50,000.**

California—East Bay Municipal Utility Dist., W. Read, secy., 512 16 St., Oakland, Aug. 19, 18,850 lin. ft. 2- to 8-in. c.i. watermains, Inv. L.S. 303, Alameda and Contra Costa Counties, from Underground Constr. Co., 354 Hobart St., Oakland, **$22,247.** CD 8/11.

Ill., Chicago—Dpt. P. Wks. O. E. Hewitt, comr., Aug. 18, **(a)** 36 in. water pipe, fittings, est. $320,000 **(b)** 24 in. water pipe, fittings, est. $100,000, from United States Pipe & Fdry. Co., 122 S. Michigan Ave., c.i. pipe, **(a) $252,600 (b) $75,980*****from Lock Joint Pipe Co., 150 Rutledge Ave., East Orange, N. J., steel shell pipe, **(a) $205,000 (b) $76,209*****from Material Service Co., 33 N. La Salle St., rein.-con. pipe **(a) $127,200 (b) $89,791.** CD 8/11 and 8/12—ENR 8/13.

†**Maryland**—U. S. Eng., Aberdeen, filtration plant alterations, addns., from American Water Softener Co., 4 St. and Lehigh Ave., Phila., Pa.

Md., Towson—Comrs. Baltimore Co., Courthouse, Aug. 17, c.i. watermains in Gray Manor, Contr. 63, and Edgewater, Contr. 64W, from Chas. J. Spielman Co., 2210 Russell St., Baltimore. CD 8/6—ENR 8/13.

†**Mich., Detroit**—Bd. Water Comrs., Water Bd. Bldg., Detroit, watermains, Contrs. DM-3 and DM-4, from Gargaro Constr. Co., Inc., 40 E. Seven Mile Rd., Detroit, **$171,724** and **$251,750,** respectively. **FWA.** CD 7/14—ENR 7/16.

†**R. I., Portsmouth** and **Middletown**—Federal Works Agency, 18 and F Sts. N.W., Wash., D. C., Contr. 1, 2½ mi. 20 and 24 in. c.i. or asbestos cement pipe line, from R. Zoppo, 44 Ramsdell Ave., Roslindale, Mass., **$148,932.** CD 7/16—ENR 7/23.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, WW pump. plant, from Cunningham & Wingrove, 2601 Race St., Fort Worth, under **$50,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, Aug. 4, from E. M. Null, Nixon Bldg., Corpus Christi, addnl. water supply and distr. sys., under **$50,000;** addnl. natural gas distr. sys., under **$50,000;** sanitary sewerage sys., under **$50,000.** All Spec. 42-230. CD 7/28.

†**Texas**—U. S. Eng., Fort Sam Houston, Aug. 17, bldg., water, gas, sewerage sys., streets, walks, etc., Spec. 42-263, from F. L. Scott & Son, 123 Beal St., San Antonio. CD 8/5.

CONTRACTS AWARDED

†**Arizona**— U. S. Eng., 715 S. Figueroa St. Los Angeles, Calif., drilling water wells, Pinal Co., to Roscoe Moss Co., 4360 Worth Ave., Los Angeles, Calif., under **$50,000.**

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, drilling water well, Kern Co., to Roscoe Moss Co., 4360 Worth Ave., Los Angeles, under **$50,000.**

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco addnl. water distr. facilities, to John J. Moore Co., 354 Hobart St., Oakland, and D. W. Nicholson Corp., 1701 San Leandro Blvd., San Leandro, under **$1,000,000.** Awarded 8/13.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, water distr. sys., Solano Co., to D. W. Nicholson Corp. and John J. Moore Co., San Leandro, **$100,000-$500,000.**

†**Colorado**—U. S. Eng., c/o Postmaster, Denver, water supply and storage facilities, Pueblo Co., to Burt & Binford Contractors, Hutchinson, Kan., **$50,000-$100,000.**

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, well drilling, to M. R. Vaughn, Dunnellon, under **$1,000,000.** Awarded 8/14.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, water supply sys., sewage lift station, sewage treatment plant, Polk Co., to Ryan Constr. Co., Tampa, **$100,000-$500,000.**

†**Georgia**—U. S. Eng., Post Office Bldg., Savannah, water distr. sys. and sanitary sewerage sys., Richmond Co., to Thomas H. Brittingham, Augusta, under **$50,000.**

†**Georgia**—U. S. Eng., 494 Spring St. N.W., Atlanta, limestone well, Chatham Co., to Layne Atlantic Co., Cromwell Rd. and Franklin Ave., Norfolk, Va., under **$50,000.**

†**Illinois**—U. S. Eng., 520 Merchandise Mart, Chicago, elevated water tank, Cook Co., to Wendnagle Co., 600 W. Cermak St., Chicago, under **$50,000.**

Ia., Charles City—J. W. McGeeney, city clk., elevated water storage tank, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, **$32,488.** Bids 8/10. CD 7/31—ENR 7/23.

†**Kansas**—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., water supply sys., to C. S. Foreman, New York Life Bldg., Kansas City, Mo.; river intake, to List & Weatherly Const. Co., Railway Exchange Bldg., Kansas City, Mo.

★†**Me., Portland** — Portland Water Dist., watermains to various islands in harbor, Me., 17-134, Contr. 1, to Bennett Constr. Corp., 1 Dana St. Est. **$985,000. FWA.** CD 8/16—ENR 8/13.

†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, dispensing sys., water separator tanks, water control and electrol syst., Barnstable Co., to Aqua Systems, 385 Gerard Ave., New York, N. Y., under **$50,000.**

Michigan—State Hy. Dpt., Lansing, pump house on Detroit Industrial Expressway, at Monroe, Wayne Co., to Getman Bros., South Haven, **$22,768.** Bids 8/12. CD 8/5.

†**Mississippi**—U. S. Eng., Courthouse & Postoffice, Mobile, Ala., pump. station, to J. E. Milam Co., 8940 1st Ave. S., Birmingham, Ala.

†**North Carolina**—U. S. Eng., 33 Customhouse, Charleston, S. C., drilling well, Robeson Co., to Virginia Machinery & Wells Co., Inc., 1319 E. Main St., Richmond, Va., under **$50,000.**

†**Oregon**—U. S. Eng., Pittock Blk., Portland, water and sewerage sys., Benton Co., to B. H. Sheldon, Corvallis, **$100,000-$500,000.**

Ore., Prineville—Pacific Power & Light, W. A. Lackaff, dist. mgr., Prineville, imprv. water sys., new hydrants, watermain, well, to G. E. Scott, General Delivery, Prineville, **$15,000.** Awarded 8/14.

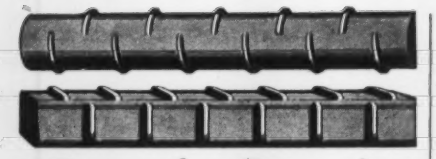
†**Rhode Island**—U. S. Eng., 819 Industrial Trust Bldg., Providence, drilling artesian wells, to Barker Artesian Well Co., 18 Cliff St., Providence, and Hamilton Artesian Well Co., Inc., Beacon St., Newport Est. **$15,000.**

†**Rhode Island**—U. S. Eng., 819 Industrial Trust Bldg., Providence, c.i. watermains, to A. E. Bragger Constr. Co., 333 Potter Ave., Warwick. Est. over **$15,000.** CD 8/12.

†**South Dakota**—U. S. Eng., 1709 Jackson St., Omaha, Neb., elevated rein.-con. water storage tank, Davison Co., to Jones-Hettelsater Constr. Co., Industrial Bldg., Kansas City, Mo., under **$50,000.**

†**Texas**—U. S. Eng., 231 W. Main St., Denison, water and sewerage sys., Lamar Co., to Parrott-Oldt Co., 403 S. Haskell St., Dallas, under **$50,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, water supply, distr. sys., also sanitary sewer facilities, Spec. 42-230, to E. M. Null, Nixon Bldg., Corpus Christi, each project under **$50,000.** Awarded 8/13. CD 7/30—ENR 8/6.



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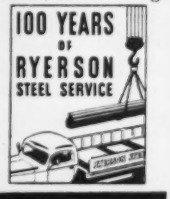

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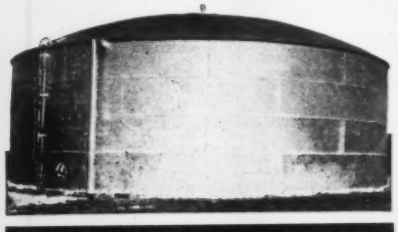

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WATER SUPPLY (Contracts Awarded, Cont'd.)

†**Texas**—U. S. Eng., San Antonio, water and sewerage sys., Builders Exch. Bldg., Palo Pinto Co., to M. F. Fischer & Son, San Antonio, under **$50,000.**

†**Texas**—U. S. Eng., San Antonio, water and sewerage sys., Bastrop Co., to E. M. Null, Nixon Bldg., Corpus Christi, under **$50,000.**

†**Texas**—U. S. Eng., San Antonio, water distr. and sanitary sewerage sys., Bastrop Co., to Panhandle-Sire-Dalton, McGregor, **$50,000-$100,000.**

†**Tex., Grand Prairie**—Water wells, drilling, casing, developing, etc., Tex. 41-373, to J. L. Myers, 206 W. Commerce St., Dallas, approx. **$15,600.** Awarded 8/8. CD 5/27—ENR 6/4.

Tex., Houston—Housing, Inc., F. Sharp, pres., Esperson Bldg., water distr. lines, facilities, force account. About **$15,000.**

Que., Longueuil, (Montreal)—Dpt. National Defense Ottawa, Ont., grading, clearing sites, constructing fdn. and rein.-con. reservoir, to Collet Freres, Ltd., 1978 Parthenais St., Montreal. About **$160,000.**

Ont., Peterborough—Watermain exten., day labor. **$18,000** voted. Utility Com., 7 Aylmer St., engrs.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Ala., Anniston—C. S. Coleman, mayor, outfall sewers. R. L. Kenan & Associates, Bell Bldg., Montgomery, engrs.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, architect-engineer services for design by A. H. Koebig, 2404 S Ave., Los Angeles, sewer, water, electrical sys., Riverside Co.

N. J., Bloomfield—Rein.-con. sewers, manholes, catch basins, etc., Pleasant Ave., Fritz and Ketner St. $62,500. WPA. C. Malstrom, Orange and N. 6 Sts., Newark. WPA. engr.

Pa., Emporium—Boro Council, rebuilding sewers, streets, bridges, miscellaneous retaining wall works, etc. $45,000.

†**N. C., Monroe**—Federal Works Agency, 606 State Planters Bank Bldg., Richmond, Va., sanitation facilities, septic tanks, etc. $19,500.

S. D., Watertown—F. J. Hubbard, city clk., exten. sewer, water and power lines. $30,000.

†**Tex., Garland**—City, R. Olinger, mayor, rejected bids Aug. 14, sewerage collection sys., Tex. 41-461. $35,500. CD 8/24.

†**W. Va., Point Pleasant**—West Virginia State Health Dpt., Richmond, sanitation facilities, vicinity here. $21,650. **FWA.**

Que., Quebec City—F. X. Chouinard, city clk., sewer in Ste. Foye Rd. and Cote Franklin. $400,000. E. Hamel, City Hall, engr.

BIDS ASKED

Bids Asked August 31

†**Mass., East Longmeadow**—Federal Works Agency, 99 Chauncey St., Boston, sewers, Mass. 19-169. Plans deposit $15. CD 8/12—ENR 8/20.

Bids Asked September 1

†**Wash., Renton**—City, 9,500 ft. 12 to 24-in. concrete or vitr. clay trunk sewer, Sunset Hy., 4 and 6 Aves. N. and Williams Sts. N. Docket 45-175. **FWA.** Plans deposit $15. J. W. Carey, Empire Bldg., Seattle, engr.

Bids Asked September 2

Md., Baltimore—Bd. Awards, City Hall, sanitary sewers, storm drains, Contr. 193.

Bids Asked About September 5

†**New Mexico**—U. S. Eng., Albuquerque, sanitary sewerage sys. $175,000, WW sys. $140,000. Plans deposit $25 each project.

Bids Asked September 16

†**Kansas**—U. S. Eng., Albuquerque, N. M., sewer and water utilities. Extended date. CD 8/19.

Bids Asked

Massachusetts—Bethlehem-Hingham Shipyards, Inc., E. Howard St., Quincy (from selected bidders), pump. station for sewage and salt water, cement asbestos, c.i. and steel piping.

LOW BIDDERS

Md., Towson—Comrs. Baltimore Co., 28,000 lin. ft. vitr. sanitary sewers, Lodge Forest, from J. L. Sullivan, 618 E. 34 St., Baltimore. Est. exceeds **$25,000.**

†**Texas**—U. S. Eng., 231 W. Main St., Denison, from Standard Paving Co., Majestic Bldg., Fort Worth, sewage disposal plant, **$76,210**; steel, concrete water st[illegible] facilities—ground and overhead, $[illegible]; WW pump. plant, **$30,010.** CD 8/17—[illegible] under Public Bldgs.

†**Texas**—U. S. Eng., 231 W. Main S[illegible] Denison, sewage plant, from Cunningham [illegible] Ingram, 2601 Race St., Fort Worth, un[illegible] **$50,000.**

†**Tex., Houston**—Sanitary sew[illegible] W. Clay St., from W. A. McClendon, 4617 [illegible]ker St., approx. **$66,400.** CD 8/11—ENR [illegible]

Tex., Houston—Sanitary sewers, [illegible]ver St., et al., from Massengale & Sauer, [illegible] Clifton St., **$28,200.**

CONTRACTS AWARDED

†**Ala., Sylacauga**—City, sewage [illegible]reatment plant, outfall line, Docket Ala. [illegible]-101, to Bush Building Co., 805 8 Ave. N., Nashville, Tenn. **$206,802. FWA.** CD 11/[illegible]41—ENR 11/20/41.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, sewage protective structure, to Ben C. Gerwick, [illegible] Market St., San Francisco, under $1,000,000. Awarded 8/14.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, sewage treatment plant, outfall sewer, to G. E. Kerns, 3712 Gaviota Ave., Long Beach, over **$100,000.** Former contract rescinded. Awarded 8/11. CD 8/17, under CA.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, sanitary facilities, to Paul C. Gibson, 372 Velarde St., Mountain View, under **$1,000,000.** Awarded 8/18.

†**Colorado**—U. S. Eng., c/o Postmaster, Denver, sewage and water installation, Pueblo Co., to Driscoll Constr. Co., 220 S. Main St., Pueblo, under **$50,000.**

†**Connecticut**—U. S. Eng., 319 Industrial Trust Bldg., Providence, R. I., sewer, water, electric utilities, Fairfield Co., to Pascone Bros., Inc., 73 Steuben St., Bridgeport. Est. **$25,000-$35,000.** Bids 8/14. CD 8/12—ENR 8/20.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, sewage collection and water distr. sys., Polk Co., to Cleary Bros. Constr. Co., West Palm Beach, **$100,000-$500,000.**

†**Iowa**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., sewer, water and gas distr. facilities, to Hoak Constr. Co., 621 63 St., Des Moines.

Ia., Burlington—R. Schlampp, city clk. west end outlet sewer, to Phelan Constr. Co., Lane Bldg., Davenport, **$28,066.** Bids 8/10. H. A. Follmer, city engr.

Ia., Davenport—City, R. C. Graham, supt. constr., district sewer, to Phelan Constr. Co., Lane Bldg., **$26,537**; lateral sewers, to D. E. Keeler Co., 1015 Main St., **$28,603.** Bids 8/4. CD 7/21—ENR 7/23.

†**La., New Orleans**—Sewerage & Water Bd., New Orleans, sewer exten., La. 16-109, tentatively awarded to Boh Bros. Constr. Co., 2400 Cypress St., **$67,100.** Est. **$69,000. FWA.** Bids 8/12. CD 7/24—ENR 7/30.

†**N. H., Portsmouth**—City, Street Comrs., City Hall, sewers, NH 27-108, to H. Di Tullio, 16 Laval St., Hyde Park, Mass, **$32,029.** Bids 8/19. CD 8/10—ENR 8/13.

†**North Carolina**—Area Engineer, Charlotte, storm drainage, to Blythe Bros. Co., 424 S Brevard St., Charlotte. Bids 8/8.

★†**Ohio**—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., storm sewers and gas pipe lines, Allen Co., to G. H. Leach Co., De Graff, under **$1,000,000.**

†**Pennsylvania**—U. S. Eng., Chimes Bldg., Syracuse, N. Y., catch and settling tank boxes, Lycoming Co., to O. G. Kelley & Co., 91 Taylor St., Boston, Mass., under **$50,000.**

Pa., Bellevue—Bd. Comrs. Ross Twp., W Winner, secy., Hamilton School, 6 mi. terra cotta sanitary sewers, to A. D'Allesandro, 54 Wabash Ave., and Kelly Constr. Co., 7327 Kelly St., both Pittsburgh. Est. **$50,000.** Bids 7/27. CD 7/24.

†**Texas**—U. S. Eng., Fort Sam Houston, sanitary sewers and water lines, Spec. 42-258, to M. F. Fischer & Son, Builders Exchange, San Antonio, under **$50,000** ea. CD 8/3—ENR 8/6.

†**Texas**—U. S. Eng., Fort Sam Houston, sanitary sewers, Spec. 42-231, to Armstrong & Webb, Abilene, under **$50,000.** Awarded 8/14. CD 7/29—ENR 8/6.

†**Texas**—U. S. Eng., San Antonio, concrete storm drain, Bexar Co., to Luther A. Turner, Kyle, **$50,000-$100,000.**

Tex., Houston—Housing Inc., F. Sharp, pres., c/o Esperson Bldg., sewer collecting lines facilities, force account. About **$25,000.**

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, sewerage sys., Snohomish Co., to Chisholm & Elford, Box 54, Bellingham, **$50,000-$100,000.**

†**Wisconsin**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., incinerator, gate house, tram repair shop, etc., DA-W-1095-173, to Hamm Constr. Co., 1423 Highland Pkway., St. Paul, Minn. Bids 8/3.

BRIDGES GRADE CROSSINGS

PROPOSED WORK

Okla., Bernice—Delaware Co., made preliminary plans stone bridge across Bull Creek near Grand Lake. $28,000. J. J. Tobey, Vinita, engr.

Que., Montreal—Suspension bridge across Riviere de Prairie. $30,000.

BIDS ASKED

Bids Asked September 1

Indiana—State Hy. Comn., Indianapolis, 40 ft rein.-con. arch bridge over Duck Creek, Henry Co., bids 8/18 rejected; 2 bridges, Davies and Greene Counties, no bids received 8/18. CD 8/4—ENR 8/6.

Bids Asked September 4

O., Cleveland — Bd. Comrs. Cuyahoga Co., bridge paving, Lorain-Carnegie Ave. $77,000. J. O. McWilliams, Standard Bldg., engr.

Tennessee—State Hy. Dpt., Nashville, 0.377 mi. overhead and approaches at N. C. & St. L. Ry. and Carroll St., in Tullahoma, on State Hy. 55, Coffee Co.

LOW BIDDERS

Indiana — State Hy. Comn., Indianapolis, Aug. 18, 60 ft. rein.-con. arch bridge, Hancock Co., and 80 ft. rein.-con. arch bridge, Henry Co., from J. R. Gates, 1226 Elmwood St., Fort Wayne, **$60,902** and **$49,422**, respectively, est. $73,529 and $59,744 respectively***30 ft. plain concrete arch bridge, Crawford Co., from Allen & Wilson, Vincennes, **$27,304**, est. $30 546. CD 8/4—ENR 8/6.

Maryland—State Rds. Comn., Baltimore, Aug. 18, concrete road and 5 span bridge, Harford Co., Contr. H-120-3-466, from Ed. A. Daylor, Coatesville, **$200,106.**

Michigan—State Hy. Dpt., Lansing, Aug. 12, 3 span bridge on U. S. 41 and M-28, Marquette Co., from Alfred Lindberg & Sons, Ishpeming. **$31,932.** CD 8/5.

CONTRACTS AWARDED

Michigan—State Hy. Dpt., Lansing, 6 span grade separation at Pelham Rd., Wayne Co., to Peninsular Constr. Co., 127 Federal Sq. Bldg., Grand Rapids. **$169,335.** Bids 8/12. CD 8/5.

Ontario—Dpt. Hys., Toronto, 155 ft. rein.-con. rigid frame bridge over Departure Creek, west of Cochrane, to R. A. Blyth Constr. Co., Ltd., 7 St., Andrews Gardens, Toronto. **$80,000.** Bids 8/12. CD 7/28—ENR 7/30.

STREETS AND ROADS

BIDS ASKED

Bids Asked August 31

New Jersey—S. Miller, Jr. comr. State Hy. Dpt., Trenton, grading, paving 12,000 sq. yd. road, city of Camden, Camden Co.

Bids Asked September 1

Ill., Antioch—Bituminous seal coating 1.6 mi.

Maryland—State Roads Comn., Baltimore, grading, draining, concrete surfacing 3.07 mi. hy. Contr. AA-324-366, Anne Arundel Co.

Md., Baltimore — Bd. Awards, City Hall, grading hy., Contr. 772.

Minn., Worthington — W. C. Thom, aud, Nobles Co., regraveling 45 mi. Job 4211. $25,000 (not official). H. R. Bary, co. engr.

★**Ohio**—St. Hy. Dpt., Columbus, grading, draining, replacing portions pavement with concrete 7.878 mi. Sects. C and D of SH 7 US 52, Adams Co., $72,050; widening, tar concrete and rock asphalt resurfacing 3.666 mi. Sects. F and Yellow Springs of SH 195, US 68 and Section Xenia of SH 29, US 35, Greene Co., $70,730; aggregate treatment T-109, 10 mi. Sects. A, B, C, D and Custar of SH 591, Henry and Wood Counties, $20,064; asphaltic concrete resurfacing 0.282 mi. Sect. Millersburg of SH 39, US 62, Holmes Co., $3,240; 0.271 mi. Sects. Painesville and J of SH 2, US 20, Lake Co., $5,840; grading, drainage structures, concrete slab bridge, 2 timber bridges, removing, replacing concrete wearing surface 5.181 mi. Sects. O, P, G, H, N-1 and N-2 of SH 291, Lorain and Medina Counties, $500,000.

West Virginia—State Road Comn., Charleston, grading, draining concrete paving 0.364 mi. State Route 62, Project DANI-3-A, Mason Co.

Bids Asked September 4

Tennessee—State Hy. Dpt., Nashville, grading, draining, paving 2.73 mi. FAP 46-A(5) Parts 1 and 2, Dickson Co.

Bids Asked September 16

Delaware—State Hy. Dpt., F. V. du Pont, chn., Dover, concrete sidewalks, etc. 0.35 mi. Georgetown toward Lewes, Georgetown, Contr. 821, 0.406 mi. from Seaford to Nylon plant, Seaford, Contr. 822, both Sussex Co.; addn. to motor vehicle testing lane, 8th and Bancraft Parkway, Wilmington, Contr. 823; grading, brick sidewalks, etc. 490 ft. East St., Dover, Constr. 824 Kent Co.; adv. ENR 8/27.

Bids Asked

Ia., Davenport—Mayor, bids soon, paving East River St. from Iowa to Mound Sts. $70,000.

Maryland—State Roads Comn., Baltimore, received no bids Aug. 18, grading, draining, gravel surfacing 0.377 mi. Contr. P-315-4-511, Prince George Co.

Minnesota—State Hy. Dpt., St. Paul, rejected bids July 31, imprv. 1.5 mi. S.P. 2752-12, TH 55-188 and S.P. 2753-24, TH 100-130. CD 8/12—ENR 8/20, under LB.

Nebraska—State Dpt. Road & Irrigation, W. G. Scott, state engr., Lincoln, rejected bids July 23, imprv. Patrols 11012 and 11058, also Patrols 11025 and 11051. CD 7/14—ENR 7/16.

Ohio—State Hy. Dpt., Columbus, received no bids Aug. 18, imprv. 0.984 mi. Mahoning and Columbiana Counties, 1.079 mi. Lorain Co.; 0.183 mi. Lawrence Co.; 1.932 mi. Hocking Co.; 3.787 mi. Brown Co.; 0.045 mi. Licking Co.; 0.174 mi. Washington Co. CD 8/5—ENR 8/13.

†**Texas**—U. S. Eng., Camp Bowie, replacing approx. 5 mi. asphalt roads with concrete. $200,000. Plans deposit $25.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, grading, draining. Plans deposit $25.

Washington—State Hy. Dpt., Olympia, rejected bids Aug. 18, imprv. 2.68 mi. Graves Rd. and 1.5 mi. Crestline Rd., Spokane Co. Received no bids Aug. 18, imprv. 41.64 mi. Okanogan and Ferry Counties. CD 8/10—ENR 8/13.

LOW BIDDERS

Alabama—W. G. Pruett, dir. State Hy. Dpt., Montgomery, Aug. 14, imprv. 1.041 mi. Madison Co., from Mitchell Bros. Constr. Co., 3828 1 Ave. S., Birmingham. Proposals (A) **$130,284** (B) **$53,233**; 1.496 mi. Madison Co., from Carlton Constr. Co., Albany, Ga., **$66,-527.** CD 8/6.

Arizona—State Hy. Comn., Phoenix, Aug. 12, imprv. 7.6 mi. Phoenix-Prescott Hy., from L. M. White Contg. Co., P. O. Box 2350, Tucson, **$313,058.** CD 8/5.

Calif., Burbank — City Council, Aug. 11, imprv. portions Victory Blvd. and Buena Vista St., from T. E. Sherlock, 1103 W. 40 St., Los Angeles, **$84,122.** CD 8/7.

D. C., Wash.—Dist. Comrs., Dist. Bldg., Aug. 14, imprv. roadways, 8,500 tons bituminous surface course, 9,200 tons asphaltic concrete base course, from McGuire & Rolfe, 1401 First St. N.E., **$123,085.** CD 8/10.

Ill., Chicago—Dpt. P. Wks., O. E. Hewitt, comr., Aug. 17, concrete paving N. and S. Halsted St., W. Van Buren St. to W. Grand Ave., from John Dillon & Co., 2953 S. Halsted St., **$222,890.** CD 8/10.

Ill., Chicago—Dpt. P. Wks., Aug. 20, concrete paving N. Homan Ave. from W. Madison to W. Division Sts., from Chatham Paving Co., 7050 S. Wabash Ave., **$168,556.** CD 8/17.

Michigan—State Hy. Dpt., Aug. 12, imprv. 1.786 mi. Allegan Co., from West Shore Constr. Co., Zeeland, **$129,777**; 0.582 mi. Baraga Co., from Thornton Constr. Co., Hancock, **$56,336.** CD 8/5.

Minnesota—State Hy. Dpt., St. Paul, Aug. 7, imprv. 12.8 mi. S.P. 0901-26, Divs. A, B and C, TH 23-185, S.P. 0901-24, TH 23-185 and S.P. 0901-27, TH 23-185, etc., from Ulland Bros., Austin, **$149,687**; 2.9 mi. S.P. 2801-10, TH 16-9, etc., from Roverud Bros., Spring Grove, H. J. Dunn, 436 Bay St., St. Paul, and J. F. Hanson Constr. Co., Albert Lea, **$84,715.** CD 7/22—ENR 7/30.

Minnesota—State Hy. Dpt., St. Paul, Aug. 12, imprv. 11.9 mi. Project 19-506-02, DA-WI-5, for Dakota Co., from J. W. Craig, 1814 N.E. California St., Minneapolis, **$42,533.** CD 8/12.

Ohio—State Hy. Dpt., Columbus, Aug. 18, 1.729 mi. Stark Co., from Elmer Vogt Paving Co., 846 Wellman Ave., Massillon, **$35,236.** Est. $35,550. CD 8/5—ENR 8/13.

†**Texas**—U. S. Eng., Fort Sam Houston, Aug. 3, access road, Spec. 42-245, from Southern States Constr. Co., 203 San Jacinto Bank Bldg., Houston, **$50,000-$100,000.** CD 7/29.

†**Texas**—U. S. Eng., Fort Sam Houston, access road, Spec. 42-239, from Ruby, Wallace & Bowden, 2101 Enfield Rd., Austin.

Tex., Fort Worth—Tarrant Co. and State Hy. Dpt., Austin, grading, culverts 3 mi. road, from C. M. Campbell, Smithville, **$34,391.**

CONTRACTS AWARDED

Arkansas — State Hy. Dpt., Little Rock, imprv. 28.1 mi. Yell Co., to Linwood Smith, Lake Village, **$25,163*****4.8 mi. Lonoke Co.

LEADITE

The Pioneer Self-Caulking Material for C. I. Pipe

TABLE OF COMPARATIVE QUANTITIES

Nominal inside dia. of pipe, in.	Depth of joint, inches of Leadite	Approx. lbs. of Leadite per joint	Depth of joint, inches of lead	Approx. lbs. of lead per joint
4	2.5	2.00	2.25	8.56
6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.63
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	33.07
18	2.5	9.25	2.25	36.88
20	2.5	10.50	2.25	40.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	65.36
36	2.75	19.00	2.50	77.96
48	3.50	30.00	3.00	121.15
54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

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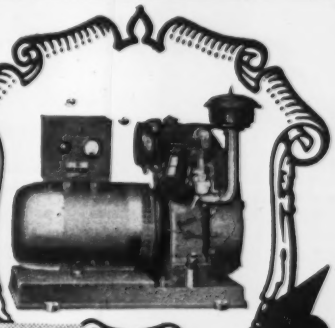
Girard Trust Co. Bldg., Philadelphia, Pa.

No Caulking



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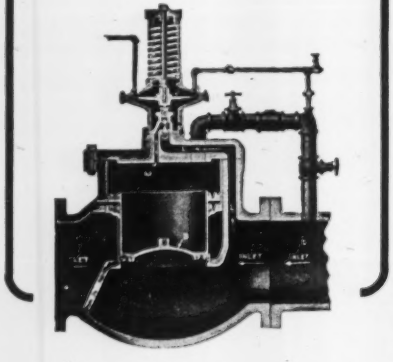

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STREETS, etc. (Contracts Awarded, Cont'd.)

and 1.07 mi. in Stuttgart, to Pioneer Constr. Co., Malvern, **$42,434** and **$33,160** respectively ***3.272 mi. Saline Co., to S. M. Dixon, Warren, **$128,878*****0.312 mi. and treated timber and concrete overpass, at Pine Bluff, to J. P. McNulty Constr. Co., 300 Mulberry St., Pine Bluff, **$72,235.** Grand total **$301,870.** Bids 8/20. Action deferred 1.591 mi. Chicot Co. CD 8/12.

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, paving, to Basich Bros., 530 S. Normandie Ave., Torrence, under **$500,000.** Awarded 8/15.

★**†California**—U. S. Eng., 74 New Montgomery St., San Francisco, seal coating roads, to Doudell Constr. Co., P. O. Box 488, San Jose, under **$1,000,000.** Awarded 8/13.

Calif., Oakland—F. Colbourn, city clk., imprv. Middle Harbor Rd. and Ferro St., to Heafey-Moore Co., 344 High St., Oakland, **$25,373.** Est. $26,836. Bids 8/18, awarded 8/18. CD 8/14.

D. C., Wash.—Distr. Comrs., District Bldg., concrete paving, 14,300 sq. yd. roadways, to W. F. Brenizer Co., 1504 S. Capitol St., **$68,274.** Est. $69,000. Bids 7/24, awarded 8/5. CD 7/17.

★**†Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, roads, to W. H. Armston Co., Inc., Dunedin, under **$1,000,000.** Awarded 8/13.

†Florida—U. S. Eng., Courthouse & Postoffice, Jacksonville, surfacing roads, Lee Co., to J. L. Cone & J. D. Manly, Caesar Ave. and Cumberland St., Tampa, **$50,000-$100,000.**

†Florida—U. S. Eng., Courthouse & Postoffice, Jacksonville, roads and streets, Hernando Co., to J. L. Cone & J. D. Manly, Caesar Ave. and Cumberland St., Tampa, under **$50,000.**

★**†Illinois**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S.A. 1, roads, walks, drainage, NOY 5278, to Eric Bolander Constr. Co., Winchester Rd., Libertyville, **$1,900,000.** Awarded 8/10. Additional to CD 3/13, under CA.

★**†Kansas**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., concrete pavement, Saline Co., to Booth & Olson, Inc., 622 Insurance Exch. Bldg., Sioux City, Ia., **$1,000,000-$5,000,000.**

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, test roads, to Mahoney Bros., Knickerbocker Bldg., Baltimore.

†Maryland—U. S. Eng., Standard Oil Bldg., Balt'more, paving road and parking area, to C. J. Langenfeder & Son, Rosedale.

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, road, utilities, spur track, Inv. 175-43-Neg. 40, to Coughlan Constr. Co., Inc., 80 Federal St., Boston, Est. over **$25,000.** Bids 8/17. CD 8/14.

†Massachusetts—U. S. Eng., 319 Industrial Trust Bldg., Providence, R. I., roads, Hampden Co., to Kelleher Corp., Turners Falls, **$100,000-$500,000.**

★**Michigan**—State Hy. Dpt., Lansing, imprv. 8.04 mi. Branch and St. Joseph Counties, to J. W. Hobeck, Holland, **$579,685;** 1.166 mi. Wayne Co., to Chas. J. Rogers, Inc., 14836 Grand River Ave., Detroit, **$231,655.** Bids 8/12. CD 8/5.

★**†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, clearing, grubbing, grading, paving, draining, fertilizing and seeding, etc., Macomb Co., to Julius Porath & Son Co., 702 Transportation Bldg., Detroit, **$1,000,000-$5,000,000.**

Mich., Detroit—Dpt. Street Rys., St. Jean and Shoemaker Aves., rein.-con. paving, draining at Wyoming Ave. Car House, to Colwell Cement Constr. Co., 17191 Griggs Ave., **$33,380.**

Miss., Pascagoula—City, street imprvs., **WPA. $41,000.**

Montana—State Hy. Comm., Helena, surfacing 6.756 mi. Kalispell-Libby Rd., to Union Constr. Co., Great Falls, **$104,840.** Bids 8/17. CD 8/5.

N. J., Eatontown—Grading, 8 in. rein.-con. access road, **WPA, $59,068.** J. H. Weitzer, Chestnut and Hamilton Aves., Trenton, WPA engr.

★**N. Y., Far Rockaway**—Long Island R. R. Co. Penn Station, and Transit Comm., 270 Madison Ave., New York, permanent hy. facilities, Hammel to Far Rockaway, Transit Comm. Case 2886, Contr. 9, to Del Balso Constr. Corp., 220 E. 42 St., New York. **$1,119,000.**

†North Carolina—U. S. Eng., 33 Customhouse, Charleston, grading, Union Co., to Gilbert Eng. Co., Inc., Statesville, under **$50,000.**

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, roads, Muskogee Co., to S. E. Evans Constr. Co., Standard Paving Co., 2119 E. 11 St., and Laymon Constr. Co., 3001 Riverside Dr., all Tulsa, Okla., **$50,000-$100,000.**

Okla., Oklahoma City—Helen Nix, clk., Oklahoma Co., concrete curbing, asphalt paving E. Reno Ave. **$30,000** and Eastern Ave. Rd. **$60,000. WPA.** Bids 8/10. CD 8/5.

†Tennessee—U. S. Eng., 306 U[illegible] Courthouse, Nashville, excav., clearing, grading, Montgomery Co., to Forcum-James [illegible] Clarksville, **$100,000-$500,000.**

†Texas—U. S. Eng., Fort Sam Ho[illegible] road, Spec. 42-240, to Southern States [illegible] Co., 203 San Jacinto Bank Bldg., Houst[illegible] **$100,000.** CD 8/19, under LB. $50,000-

†Texas—U. S. Eng., Fort Sam [illegible] Houston, access road, Spec. 42-247, to South[illegible] States Constr. Co., San Jacinto Natl. [illegible] Bldg., Houston, under **$50,000.** Bids 8/[illegible] awarded 8/12. CD 7/29.

†Texas—U. S. Eng., Fort Sam Ho[illegible], supplemental contract, roads and walk[illegible] J. O. Mack, Jr., Corpus Christi, approx. $25,000.

†Texas—U. S. Eng., 25 St. and Ave. P, Galveston, clearing, grubbing, grading [illegible] and streets, to Ballantyne Eng. Co., 21[illegible] Commerce Bldg., Houston, **$50,000-$100,000.** Niven, Staud, Rather & Turner, Bankers Bldg., Houston, archts. and engrs. CD 8/13.

†Texas—U. S. Eng., San Antonio, streets and hardstandings, Bexar Co., to J. Skelton, 225 Tuxedo St., San Antonio, **$100,000-$500,000.**

†Texas—U. S. Eng., San Antonio, streets, Bexar Co., to J. O. Mack, Jr., San Antonio, under **$50,000.**

†Texas—U. S. Eng., San Antonio, road and sidewalks, Bexar Co., to L. P. Sholl, San Antonio, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, clearing, grubbing, to J. D. Scarbrough, Corpus Christi, under **$50,000.**

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, training aid, roads, drainage, Cooke Co., to L. J. Miles Constr. Co., Roaring Springs Rd., Fort Worth. **$100,000-$500,000.**

†Texas — U. S. Eng., San Antonio, surfacing, Bastrop Co., to Holland Page, Georgetown Rd., Austin, under **$50,000.**

Tex., Houston—Harris Co., grading 5½ mi. Decker Dr., to W. E. Worthen, 6806 U St. **$40,009.** Awarded 8/13.

†Utah—U. S. Eng., 32 Exchange Pl., Salt Lake City, roads, to W. W. Clyde & Co., Springville, **$100,000-$500,000.** Bids 8/11.

†Utah—U. S. Eng., 32 Exchange Place, Salt Lake City, gravel spread, Tooele Co., to V. Newman, Salt Lake City, **$50,000-$100,000.**

Utah—State Road Comm., J. S. Evans, chn., Salt Lake City, bituminous surfacing 3 mi. road between Nephi and Lavan, Juab Co., own forces, **$50,000.**

Washington—St. Hy. Dpt., Olympia, surfacing 3.4 mi. State Road 6, Cusick north, and stockpiling, constructing bituminous surfacing 3.1 mi. State Road 7, to Carbon Bros., N. 3430 Cook, Spokane, **$51,815** and **$54,974** respectively. Bids 8/18. CD 8/3—ENR 8/6.

West Virginia—State Road Comm., Charlestown, imprv. 14.9 mi. Mineral Co., to Potomac Const. Co., Martinsburg, **$50,758;** 4.303 mi. Preston Co., to A. B. Osborne & Co., Clarksburg, **$30,833.** Bids 8/18. CD 8/11—ENR 8/13.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, surfacing plant service roads, to Rein & Schultz, Madison.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, grading, draining, to R. Van Vechten, 9564 Beverly Pl., Wauwatosa. Consoer, Townsend & Quinlan, 211 W. Wacker Dr., Chicago, Ill., engrs.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, grading, to J. Rasmussen & Sons Co., 7 St., Oshkosh.

†Alaska, Ketchikan — City, filling, imprv. 1,600 ft. Tongass Ave., to A. C. Kreidler, Ketchikan, **$47,988.** Est. $47,198. **FWA.**

N. B., Moncton—Dpt. National Defense, Ottawa, Ont., roads, etc. at Y Depot, to Rayner Constr. Co., Ltd., Moncton. **$128,000.**

Saskatchewan — Provincial Govt., Regina, graveling 33 mi. hy., Fiske, to A. A. Voice, 7 Main St., Bradwell, **$35,000.**

EARTHWORK WATERWAYS

PROPOSED WORK

Louisiana — Jefferson-Plaquemines Drainage Dist., c/o N. E. Hero, Box 84, Gretna, canals, bridges, Jefferson and Plaquemines Parishes. $117,264. Applied for FWA funds.

†La., Dunbar—U. S. Eng., foot of Prytania St., New Orleans, dredging in North Grand Isle Pass, South Grand Isle Pass, and Le Petit Pass, in Mississippi Sound, St. Bernard Parish, near here.

La., Golden Meadow—Temple Hargrove Oil Co., Commerce Bldg., Houston, Tex., 100 ft. timber pile finder with two 3 ft. pile clusters, dredging, etc. La Fourche Parish. Applied to War Dpt. for permit.

Utah, Gunnison—Willow Creek Irrigation Co., Gunnison, earth dam. **$30,000.**

THE WAR CAN'T WAIT..

Donald M. Nelson says to the Construction Industry:

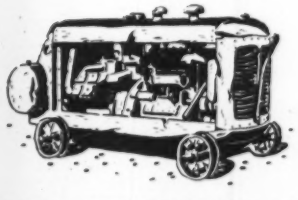
"Our country's war production demands huge quantities of strategic scrap materials—iron, steel, rubber, tin, zinc, copper, brass, lead, burlap, rags, and rope. We need the immediate, active cooperation of the Nation's engineers in whipping this problem. On construction jobs especially, the heavy scrap must be salvaged—conveying belts, buckets, engines, etc. We urge you to get under way *at once* with an all-out drive to round up scrap on all your jobs."

U.S. NEEDS ALL SCRAP..TODAY!

SELL YOUR SCRAP TO SHORTEN THE WAR!

HERE'S WHAT TO LOOK FOR

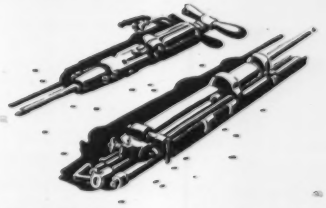
CONVEYORS of all kinds—bucket, fabric, rubber and fabric. Also old sheaves and pulleys. The Japs hold 97% of the world's rubber supply. Scrap rubber must see us through. Every ounce of rubber you ignore helps Hirohito and Hitler.



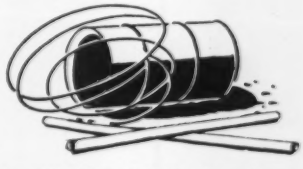
PUMPS, COMPRESSORS, ENGINES and their parts . . . pistons, bearings, cylinders, valves. Rout out old-style, outmoded equipment. Don't hoard this valuable scrap—it's worth its weight in Japs!

SHOVELS, BULLDOZERS, DERRICKS . . . tractor plates, rollers, and other parts . . . buckets, chains and cables. Remember—a 4,000 lb. "block-busting" bomb calls for half a ton of steel scrap. Turn in every other kind of material, too—don't let a single factory close down for lack of metal!

ROLLING STOCK . . . odd length rails, narrow gauge equipment, car wheels, axles, old batteries from electric mules. Every bit of metal is needed *right now!*



AIR TOOLS . . . paving breakers, jackhammers, drills and parts. Round everything up—no matter how small. It takes only half a pound of scrap for a hand grenade!



OLD PIPES, DRUMS, short lengths of pipe, broken rubber hose, battered grease drums, old truck tires, odds and ends of bars for reinforced concrete. A 50-lb. steel drum yields scrap enough for one .50-caliber machine gun!

HERE'S WHAT TO DO... Appoint one man as Salvage Manager for your department. Give him authority to *act*—to condemn old equipment, to move material, to collect scrap of all kinds. Have him separate all scrap by type. Then move it promptly through your regular scrap dealers. Don't wait—start rounding up scrap *now*—and keep it moving until the war is won!

THROW YOUR SCRAP INTO THE FIGHT!

This message approved by Conservation Division

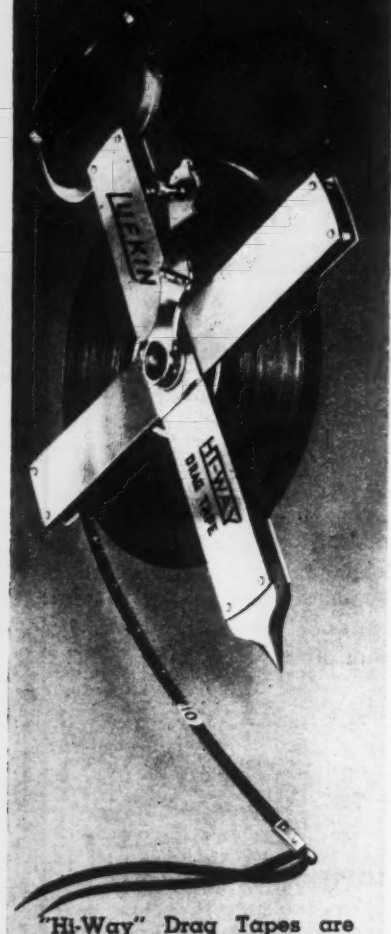
WAR PRODUCTION BOARD

This advertisement paid for by the American Industries Salvage Committee (representing and with funds provided by groups of leading industrial concerns).

LUFKIN

HI-WAY DRAG TAPE

PROMINENT MARKINGS THAT REMAIN CLEAR



"Hi-Way" Drag Tapes are made from a special, extra-tough steel with black lines and figures deeply cut into bright portions of the line. That's why Engineers everywhere find the "Hi-Way" easy to read and use even after an unbelievable amount of wear from dragging around. See them at your dealers. Write for Catalog.

LUFKIN

SAGINAW, MICHIGAN • New York City

TAPES . RULES . PRECISION TOOLS

EARTHWORK, etc. (Continued)

BIDS ASKED

Bids Asked August 31

†Connecticut—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., (selected bidders) dredging. Over $25,000.

Bids Asked September 1

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., 466,000 and 553,000 cu. yd. earthwork, Lower St. Francis Levee Dist.

Bids Asked September 8

†Texas—International Boundary Comm., J. L. Lytel, proj. engr., San Benito, clearing, grubbing 1,140 acres levee and floodway right-of-way in Main and Arroyo Colorado Flood-

LOW BIDDERS

†California — Bureau Reclamation, Customhouse, Denver, Colo., Aug. 12, fabricated pipe, fittings for conduit tube valves, Shasta Dam, Kennett Div., Central Valley Project, Spec. 1654-D, from Associated Piping & Engineering Co., Ltd., 2332 E. 38 St., Vernon, **$71,169.** CD 7/21—ENR 7/23.

†California — U. S. Eng., Wright Bldg., Sacramento, Aug. 14, riprap for Sacramento River, from Hemstreet & Bell, 12 and F Sts., Marysville, **$44,300.**

Louisiana — Police Jury Lafayette Parish, 119.8 mi. channel for drainage ditch, 1,106,161 cu. yd. excav., from L. M. Goldberg, Abbeville, and Glazer Constr. Co., Lafayette, each 12c. per cu. yd.

†Texas—U. S. Eng., Fort Sam Houston, Aug. 17, drainage facilities, Spec. 42-300, from Riesing Constr. Co., Edinburg.

CONTRACTS AWARDED

†Alabama—U. S. Eng., Courthouse and Customhouse, Mobile, dredging, Mobile Co., to Jahncke Service, Inc., 814 Howard Ave., New Orleans, La., **$50,000-$100,000.**

†Arkansas—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., earthwork, Desha Co., to Jones Gillis Contg. Co., McComb, Miss., **$100,000-$500,000,** and to H. B. Blanks Co., Jackson, **$100,000-$500,000.**

★**†California**—Bureau Reclamation, Customhouse, Denver, Colo., addnl. work, bldg. greater part Keswick Dam, to Atkinson & Kier, 662 Russ Bldg., San Francisco, **$1,492,946.** Awarded 8/14. Additional to CD 8/14/41—ENR 8/21/41, under CA.

★**†Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, drainage sys., Inv. Neg-Jax-43-111, to James Sotille, Sr., Homestead, under **$1,000,000.** Awarded 8/17.

†Georgia—U. S. Eng., Post Office Bldg., Savannah, earth fill, Chatham Co., to L. H. Simkins, Augusta, under **$50,000.**

†New Jersey—U. S. Eng., 6 and Walnut Sts., Phila., Pa., removing hard shoal, Cape May Co., to Eastern Engineering Co., 4 N. North Carolina Ave., Atlantic City, under **$50,000.**

†New Jersey—War Dpt., 2nd Corps Area, Governor's Island, N. Y., soil erosion prevention, excavating, fill, grading, topsoiling, **WPA. $91,768.** J. H. Weitzer, Chestnut and Hamilton Aves., Trenton, engr.

†New York—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., dredging, to Lavigne & Smith, Inc., 18 Taunton Ave., East Providence, R. I., and Merritt-Chapman & Scott Corp., 292 Pequot Ave., New London. Est. over **$25,000.** Bids 8/5.

†Ohio—U. S. Eng., 232 N. High St., Columbus, addnl. earth fill, Franklin Co., to Corbetta Constr. Co., Inc., 220 E. 42 St., New York, N. Y., **$100,000-$500,000.**

†Rhode Island—U. S. Eng., 819 Industrial Trust Bldg., Providence, ledge rock from river and harbor, to Lavigne & Smith, Inc., 18 Taunton Ave., East Providence. Est. over **$25,000.** Bids 7/27.

Tex., Houston—Harris Co., clearing, excav. approx. 4½ mi. open ditch. **WPA.** Approx. **$50,000.**

Saskatchewan—Prairie Rehabilitation Bd., 910 McCallum Bldg., Regina, drainage canal in connection with Swift River Project, concrete dam in Ou'Appelle River, to Gordon Hastings, Regina, **$22,000.**

UNCLASSIFIED

PROPOSED WORK

†Alabama—IMPROVEMENTS—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., plans by R. L. Kenan & Associates, Bell Bldg., Montgomery, imprvs., bldgs.

★**†California** — IMPROVEMENTS — U. S. Eng., 751 S. Figueroa St., Los Angeles, imprvs. Over $4,000,000.

Calif., Fields Landing—DOCKING BERTHS, etc.—Eureka Shipbuilders, Inc., Fields Landing, docking berths for fishing boats, homes, cabins.

†Florida—POWER LINE—City of ville, bids soon, electric power li... Baldwin and Jacksonville, to co... power lines of Florida Power & ... $475,000. Federally financed.

★**†Georgia**—IMPROVEMENTS—U... Postoffice Bldg., Savannah, im... Eng., $1,000,000. Over

Georgia — RURAL ELECTRIC ... EM — Douglas County Electric Member... Corp. J. H. Abercrombie, supt., Douglasv... imprv. sys., Douglas Co. $34,000. REA a...

Georgia — RURAL ELECTRIC S... EM — Three Notch Electric Membership ... C. Lamar Hatcher, supt., Donaldsonvi... exten. sys., Seminole Co. $58,000. REA ...

†Illinois—ELECTRIC SUBSTATI... War Dpt., 20 St. and Constitution A... N.W. Wash., D. C., 34.5 kilovolt electric ... tion and 3.5 mi. interconnecting transm... lines $99,179.

★**†Kansas**—IMPROVEMENTS—U... Eng., 1709 Jackson St., Omaha, Neb. ... imprvs. $3,000,000. Black & Veatch, 4706 ... Hway. Kansas City, Mo., engrs.

★**†Kansas**—IMPROVEMENTS—U... Eng., 1709 Jackson St., Tulsa, Okla. ... imprvs. Over $3,000,000.

†Maine—UTILITIES, etc.—Farm Security Admin., A. Kopp, bus. mgr., 17 Brief Ave., Upper Darby, Pa., rejected bids July 20 utilities, water, sewer, electric facilities, grading, walks, etc., FSAC 1-10. CD 8/4—ENR 8/6 under LB.

Maine—HATCHERY—State, A. R. Greenleaf, comr., Seashore Fisheries, Augusta, hatchery at Lanoine. $45,000.

Minn., Ortonville—AIRPORT—J. A. Jacobson, city clk., enlarging airport. C. Erickson, Alexandria, engr.

★**†Mississippi** — IMPROVEMENTS — U. S. Eng., Postoffice and Courthouse, Vicksburg, imprvs., Grenada Co. Over $3,000,000.

★**Missouri**—IMPROVEMENTS—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., imprvs., bldgs. $2,000,000. Burns & McDonnell, 107 W. Linwood St., Kansas City, Mo., engrs. CD 7/3—ENR 7/9.

N. C., Lexington—PUMPING STATION—Plantation Pipe Line Co., 26 Bway., New York, N. Y., pump. station, to accelerate flow gasoline and oil from Baton Rouge, La. to Greensboro, N. C., near here. $150,000.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, imprvs. $210,000.

†Pennsylvania—SEEDING AIRPORT—U. S. Eng., 6 and Walnut Sts., Phila., seeding airport.

Pa., Erie—YARD and DOCKAGE FACILITIES—Pennsylvania R. R. Co., W. D. Wiggins, sch. engr., Broad St. Station, Phila., addnl. yard and dockage facilities, new trackage, etc., Lake Erie Shore. $300,000.

S. D., Webster—AIRPORT—Municipal airport. $50,000.

†Texas—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., architect-engineer services by Haynes & Strange and Parkhill, and Voelcker & Dixon, Lubbock, imprvs., sanitary sewerage sys.

★**†Texas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., architect-engineer services by Haynes & Strange, and Parkhill, and Voelcker & Dixon, Lubbock, frame bldgs., $2,000,000; A. C. fueling sys., storage tanks, fuel lines, pump. station, etc., $75,000; natural gas distr. sys., over $25,000; water supply and distr. sys., over $25,000. CD 8/10—ENR 8/13.

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 231 W. Main St., Denison, bids soon outdoor overhead electrical distr. sys. Plans deposit $25.

†Texas—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, imprvs., No. 257-42-82 $79,400. CAA.

†Texas—IMPROVEMENTS—U. S. Eng., Fort Same Houston, rejected bids July 21 imprvs. sewage disposal or treatment plant, Spec. 42-172. CD 7/23—ENR 7/30, under LB.

Tex., George West—OIL TEST WELL—Brewer & Hixon, George West, bids soon drilling, casing, developing 4,400 ft. oil test well. $75,000.

★**Tex., Tyler**—INJECTION SYSTEM—East Texas Salt Water Disposal Corp., c/o B. W. Payne, pres., Tyler, bids soon salt water injection program for oil fields in vicinity of here. $2,252,250. CD 1/21—ENR 1/29.

Vt., Burlington—HANGAR, etc.—Northeast Airlines, Inc., 37 St. Paul St., soon lets contract, 1 story, 120x180 ft. hangar, machine shop office, municipal airport. $50,000. Freeman, French & Freeman, 153 Church St., archts. CD 8/14—ENR 8/20.

W. Va., Kingmont—DOCK—Virginia & Pittsburgh Coal & Coke Co., Fairmont, truck coal-loading dock, Tygart River, near here. Over $25,000.

B. C., Beaton—RADIO STATION—Secretary Dpt. Transport, Ottawa, Ont., bids soon developing radio station. $200,000.

UNCLASSIFIED (Proposed Work, Cont'd.)

B. C., Dog Creek—AERODROME—Secretary Dpt. Transport, Ottawa, Ont., bids soon developing aerodrome, $350,000.

B. C., Esquimalt—WHARF—Yarrows, Ltd., Canteen Rd., bids soon Victoria, wharf in harbor. $150,000.

B. C., Quesnel—AERODROME—Secretary Dpt. Transport, Ottawa, Ont., bids soon aerodrome development, clearing, grading, smoothing, draining, runways, taxi strips, etc. $160,000.

B. C., Sumas — AERODROME — Secretary Dpt. Transport, Ottawa, Ont., bids soon aerodrome development, clearing, smoothing, grading, draining, hardsurfaced runways, taxistrips, etc. $200,000.

N. S., Pictou—SHIPYARD BUILDINGS—Foundation Maritime Ltd., 135 Lower Water St., Halifax, bldgs. $75,000.

Ont., Lambeth—AIRPORT—Secretary Dpt. Munitions & Supply, Ottawa, bids soon airport development, hangar, etc., for Dpt. Natl. Defense for Air. $150,000.

Ont., Limoges — LANDING FIELD — Dominion Govt., Ottawa, emergency landing field. $50,000. Dpt. Transport, Ottawa, engrs.

Ont., London—HANGARS, etc.—Dominion Govt., Ottawa, hangars and other bldgs. at former field of London Flying Club, $150,000. Dpt. Air Defense, Ottawa, archts. Dpt. Munitions & Supply, Ottawa, engrs.

Que., Drummondville — PARK DEVELOPMENT—Municipality, c/o J. Marier, park development, 2 swimming pools.

BIDS ASKED

Bids Asked September 1

New York—LAND BORINGS—New York City Tunnel Auth., 200 Madison Ave., land borings, Brooklyn-Battery tunnel, Brooklyn and Manhattan. Plans deposit $5.

†**Pennsylvania** — PLANTING — Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., planting at housing project.

Bids Asked September 2

†**New York**—IMPROVEMENTS—U. S. Eng., 120 Wall St., New York, imprvs.

Bids Asked September 13

†**Kansas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., imprvs.

Bids Asked September 15

New York—TUNNEL PAVING—Port of New York Auth., 111 8 Ave., New York, tunnel paving, North Tube, Lincoln Tunnel, MHT 62, adv. ENR 8/27.

Bids Asked

★†**Arkansas**—IMPROVEMENTS—U. S. Eng., Postoffice and Courthouse, Vicksburg, Miss., imprvs. Over $1,000,000.

†**Maryland**—SEEDING—U. S. Eng., 1400 Penn-Mutual Bldg., Phila., Pa., seeding. Plans deposit $5.

†**New Jersey**—LIGHTING SYSTEM—U. S. Eng., 1400 Penn-Mutual Bldg., Phila., Pa., lighting sys. Plans deposit $10.

†**North Carolina**—SALVAGING STREET RAILWAY RAILS, etc.—War Production Bd., G. W. Robertson, 1507 Liberty Life Bldg., Charlotte, salvaging street railway rails and metallic accessories.

LOW BIDDERS

†**California**—IMPROVEMENTS—U. S. Eng., Wright Bldg., Sacramento, Aug. 12, imprvs., No. 159, from Sheldon Oil Co., Main St., Suisun, under $50,000.

†**California**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Aug. 13, imprvs., sewer and water sys., No. 177, from Werner & Webb, 1116 N. Mansfield St., Los Angeles, over $50,000.

†**California**—IMPROVEMENTS—U. S. Eng., Wright Bldg., Sacramento, Aug. 29, imprvs., from Harms Bros. and Larsen Bros., Rt. 4, Box 2220, Sacramento. $100,000-$500,000.

†**Nevada**—FUELING SYSTEM, etc.—U. S. Eng., Wright Bldg., Sacramento, Calif., Aug. 17, A.C. gasoline fueling and oil storage sys., Inv. 146, from MacDonald & Kahn, Inc., 200 Financial Center Bldg., San Francisco, Calif., $50,000-$100,000. CD 8/19—ENR 8/13.

†**Nevada**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., Aug. 12, imprvs. Inv. 148, from J. P. Carroll Co., 218 N. Juanita St., Los Angeles, Calif., under $50,000.

†**Nevada** — IMPROVEMENTS — U. S. Eng., San Bernardino, Calif., Aug. 12, imprvs., Inv. 148, from E. J. Galbreath, P. O. Box 1771, Las Vegas, under $50,000.

†**New Jersey** — IMPROVEMENTS — U. S. Eng., 6 and Walnut Sts., Phila., Pa., military housing, from E. R. Nichols, 5420 N 12 St., Phila., Pa.

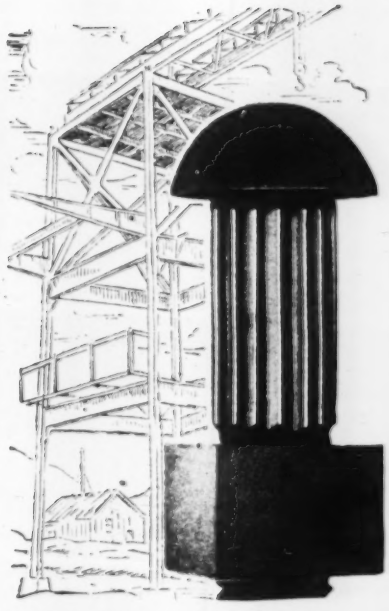
N. Y., New York—TUNNEL FINISH—Port of New York Auth., 111 8 Ave., New York, Aug. 18, tunnel finish for approach to Lincoln Tunnel, North Tube, from Atlas Tile & Marble Works, Inc., 228 E. 26 St., New York, $174,403. CD 7/29—ENR 8/6.

"Structural Rib Bolts"

(Trade mark Registered)

Manganese Steel

Galvanized and Black



The only ribbed bolt on the market that has American Standard Threads and the Automatic Lock Nut. The lock nut that complies with Federal Specification FFB-571a—used for plain bolting.

"Structural Rib Bolts," equipped with "Automatic Lock Nuts," have been approved in place of field driven rivets, not only on Federal Projects, but in practically every state and several foreign countries.

Structural Rib Bolts comply with Federal Specifications QQ-S-721a and are being used very extensively in the construction of **Defense Projects such as Ordnance Plants—Radio Towers—Hangars—Warehouses, etc.**

The following advantages of "Structural Rib Bolts" are endorsed by engineers:

1. Made from Manganese Class A Steel—guaranteed to develop more than 70,000 lbs. tensile. Tests show a 5/8" dia. bolt to be stronger than a 3/4" dia. rivet.

2. The Automatic Lock Nut is a one-piece unit, no extra parts, *really locks*—U.S. Standard threads and millions now in use on Standard Machine Bolts.

3. The ribs mush and fill the hole making a body-bound fit—The "Structural Rib Bolt" and "Automatic Lock Nut" *can be GALVANIZED* if necessary.

4. Made for every thickness of work or grip in any diameter from 1/4" to 2" inclusive.

Send direct to plant for sample "Structural Rib Bolt" and Engineering Data—no obligation.

We make shipment of large quantities from our plant at Lebanon, Pa. —Small quantities for quick deliveries from one of our warehouses.

AUTOMATIC NUT COMPANY, INC.

LEBANON, PENNSYLVANIA

America's Shoulders are BROAD

All of us can add ours to the combined strength that will win through to VICTORY. Each must do what he can BEST do. We of Davenport are building rugged and efficient Better-Bilt Davenport Locomotives to power the vital movement of war goods at key points, here and over seas.

Incidentally, we KNOW the value of SCRAP and we add our voice to that of UNCLE SAM—"Round up every bit of scrap and start it on its way to the Steel Mills—NOW! TODAY!"

STEAM-GASOLINE-DIESEL LOCOMOTIVES ELECTRIC OR MECHANICAL DRIVE

EXPORT OFFICE **BROWN & SITES** 50 Church St., N. Y. Cable Add. "Brosites"

DAVENPORT LOCOMOTIVE WORKS

A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

STEEL PLATE FABRICATION

With the most modern, completely equipped fabricating shop in the middle west, and a working force of skilled craftsmen capable of handling any project regardless of design, size or weight, we stand ready to serve you promptly and efficiently.

THE R. C. MAHON COMPANY
DETROIT, MICHIGAN

MAHON

DRILLING CONTRACTORS

DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

Foundation Testing for Bridges, Dams and All Heavy Structures

Also

Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

The
PHOENIX BRIDGE CO.

BRIDGES and BUILDINGS

General Office and Works
Phoenixville, Pa.

District Offices
New York, N.Y. Boston, Mass.
Washington, D. C.

UNCLASSIFIED (Low Bidders, Co[illegible])

†**Texas**—HARD STANDING AR[illegible] etc.—U. S. Eng., Fort Sam Houston, [illegible] hard standing areas and drives, S[illegible] from A. L. Buey, Brownwood.

†**Texas**—AIR CONDITIONING [illegible]STEM—U. S. Eng., Fort Sam Houston, A[illegible] S. air conditioning sys., Spec. 42-252, fro[illegible] Krisch-Delavan Co., 801 Main Ave., Sa[illegible] Antonio. CD 7/29.

†**Texas**—AIR CONDITIONING SY[illegible]M—U. S. Eng., Fort Sam Houston, Aug. [illegible] ditioning sys., Spec. 42-251, fro[illegible] con-Frank Co., 310 S. Flores St., San A[illegible]ttras-

†**Texas**—IMPROVEMENTS—U. S. [illegible]g., Fort Sam Houston, Aug. 14, imprvs., S[illegible] 47-271 (AS-1), from The Builders Co., 604 [illegible]Builders Exch. Bldg., San Antonio. CD 8/7.

CONTRACTS AWARDED

†**Arizona**—IMPROVEMENTS—U. [illegible] Eng., 751 S. Figueroa St., Los Angele[illegible] Calif., imprvs., runway exten., addnl. taxiways, Pima Co., to Pearson & Dickerson, Oswald Bros. & J. A. Casson Co., Phoenix, **$100,000-$500,000.**

†**Arizona**—TARGET RANGES—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., target ranges, Maricopa Co., to N. G. H[illegible] & Co., E. Glendale Ave., Phoenix, under **$50,000.**

†**Arizona** — RAILROAD SPUR — U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., railroad spur exten., crossover, Maricopa Co., to James B. Donaldson, Phoenix, under **$50,000.**

†**Arkansas**—ELECTRIC FACILITIES—U. S. Eng., Gay Bldg., Little Rock, electric power transmission lines, facilities, to Arkansas Power & Light Co., 123 W. 4 St., Little Rock. **$50,000-$100,000.**

†**Arkansas**—FIRE ALARM SYSTEM—U. S. Eng., Gay Bldg., Little Rock, automatic fire alarm sys., Jackson Co., to American District Telegraph Co., 155 6 Ave., New York, N. Y., under **$50,000.**

†**Arkansas** — GASOLINE SYSTEM — U. S. Eng., Gay Bldg., Little Rock, gasoline sys., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. Est. **$50,000-$100,000.**

†**Arkansas**—IMPROVEMENTS—U. S. Eng., Gay Bldg., Little Rock, imprvs., water supply, distr. sys., also sanitary sewerage sys., to Midwest Contg. Co., Sioux City, Ia., **$100,000-$500,000** each project.

†**Arkansas**—TANKS—U. S. Eng., P. O. Box 97, Memphis, Tenn., tanks, Lawrence and Mississippi Counties, to I. L. Starkey, Gladewater, Tex., under **$50,000.**

†**California**—ELECTRIC SYSTEM, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, electric, water, sewage sys. and flagpole, Riverside Co., to Fritz Ziebarth, Long Beach, **$100,000-$500,000.**

†**California**—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, electrical distr. sys., Riverside Co., to Electric & Machinery Service, 424 E. 2 St., Los Angeles, under **$50,000.**

†**California**—WALLS—U. S. Eng., 751 S. Figueroa St., Los Angeles, concrete walls, San Diego Co., to San Diego Gas & Electric Co., Electric Bldg., San Diego, under **$50,000.**

†**California**—IMPROVEMENTS—U. S. Eng., Wright Bldg., Sacramento, imprvs., housing units, Spec. 138, to C. B. Cameron & Son, P. O. Box 224, Merced, **$100,000-$500,000.** Bids 8/10. CD 8/3.

California—TARGET ABUTMENTS—U. S. Eng., Wright Bldg., Sacramento, target abutments, Fresno Co., to Harris Constr. Co., Fresno, under **$50,000.**

★†**California** — FENCING — U. S. Eng., 74 New Montgomery St., San Francisco, boundary fencing, to A. T. Beckett, 366 40 St., Oakland, under **$1,000,000.** Awarded 8/13.

†**California**—FIRE PROTECTION SYSTEM—U. S. Eng., 74 New Montgomery St., San Francisco, fire protection sys., Alameda Co., to Conner & Brant, Redwood City, under **$50,000.**

★†**California** — IMPROVEMENTS — U. S. Eng., 74 New Montgomery St., San Francisco, imprvs., to J. A. Casson Co., 22195 Meekland Ave., Hayward, and N. M. Ball Sons, Box 494, Berkeley, under **$1,000,000.** Awarded 8/14.

★†**California**—IMPROVEMENTS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. imprvs., facilities, Supplementary Agreement 1, NOY 5326, to Vinson & Pringle and Del R. Webb Constr. Co., P. O. Box 930, Phoenix, Ariz., **$10,528,000.** Awarded 8/14. Additional to CD 6/30, under CA.

†**California** — LIGHTING SYSTEM — U. S. Eng., 751 S. Figueroa St., Los Angeles, lighting sys., Los Angeles Co., to Otto K. Olesen Illuminating Co., Ltd., Hollywood, under **$50,000.**

†**California**—IMPROVEMENTS—U. S. Eng., Wright Bldg., Sacramento, imprvs., to Frederickzen & Westbrook, 212 13 St., Sacramento.

†**California**—IMPROVEMENTS—U. S. Eng., 74 New Montgomery St., San Francisco, imprvs., to W. J. Wilkinson & H. B. Scott, P. O. Box 960, Watsonville. Awarded 8/19.

UNCLASSIFIED (Contracts Awarded, Cont'd.)

★**California**—RAILROAD — Key Interurban System, 2129 Grove St., Oakland, exten. railroad from Oakland to Richmond, incl. loading platforms, overpass, substations, etc., to Eaton & Smith, 715 Ocean Ave., San Francisco, and Swinerton & Walberg, 615 Standard Oil Bldg., San Francisco, **$1,650,000**, cost plus fixed fee basis. CD 6/8—ENR 6/11.

†**Colorado**—TARGET RANGES—U. S. Eng., c/o Postmaster, Denver, target ranges, Denver Co., to A. C. Bundgaard, 1045 S. Columbine St., Denver, under **$50,000**.

†**Colorado**—ELECTRICAL WIRING—U. S. Eng., c/o Postmaster, Denver, electrical wiring, Eagle Co., to McNeill Electric Co., Pueblo, **$100,000-$500,000**.

†**Colorado** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., c/o Postmaster, Denver, electrical distr. sys., Pueblo Co., to Dowzer Constr. Co., Hutchinson, Kan., under **$50,000**.

†**Connecticut**—BARBED WIRE FENCE—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., barbed wire fence, Hartford Co., to Hartford Wire Works Co., 90-92 Allyn St., Hartford, under **$50,000**.

★†**Florida**—IMPROVEMENTS—U. S. Eng., Courthouse & Postoffice, Jacksonville, imprvs., Inv. Neg.-Z.S.-43-2, to Krusen Land & Timber Co., Zephyrhills, under **$1,000,000**. Awarded 8/12.

†**Florida**—IMPROVEMENTS—U. S. Eng., Courthouse & Postoffice, Jacksonville, imprvs., paving, runways, taxiways, aprons, hardstandings, Clay Co., to James H. Craggs Constr. Co., B. B. McCormich & Sons, Inc., and R. H. Wright & Son, Ocala, **$50,000-$100,000**.

†**Florida**—IMPROVEMENTS—U. S. Eng., Courthouse & Postoffice, Jacksonville, imprvs., bituminous surface course on runways and taxiways, Clay Co., to Marion Contg. Co., Ocala, **$50,000-$100,000**.

★†**Florida**—IMPROVEMENTS—U. S. Eng., Courthouse & Postoffice, Jacksonville, imprvs., Inv. Neg-Jax-43-85, to Ebersbach Constr. Co., Stovall Office Bldg., Tampa, under **$1,000,000**. Awarded 8/13.

★†**Florida**—IMPROVEMENTS — U. S. Eng., Postoffice & Courthouse, Jacksonville, imprvs., Inv. Neg-Jax-43-103, to Ocala Const. Co., Ocala, under **$1,000,000**; imprvs., Inv. Neg-Jax-43-103, to Marion Contg. Co., Ocala, under **$1,000,000**. Awarded 8/13.

★†**Florida** — SEEDING, etc. — U. S. Eng., Courthouse & Postoffice, Jacksonville, sprigging and seeding, Inv. Neg.-Jax-43-100, to Florida Nursery & Landscape Co., Leesburg, under **$1,000,000**. Awarded 8/12.

★†**Florida** — VENTILATING, etc. — U. S. Eng., Courthouse & Postoffice, Jacksonville, ventilating and air cooling sys. in bldgs., Inv. Neg.-B.R.-43-5, to Tipton House Cooler Corp., Miami, under **$1,000,000**. Awarded 8/12.

†**Florida**—UNLOADING PLATFORM—U. S. Eng., Courthouse & Postoffice, Jacksonville, unloading platform, Lee Co., to Moody Bros. Plumbing & Heating Co., Fort Myers, under **$50,000**.

†**Florida** — IMPROVEMENTS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., facilities, NOY 5424, to G. A. Hanson Co., Inc., and Wells & Forbes Co., 1302 1st Natl. Bank Bldg., Tampa, **$175,000**.

★†**Georgia**—GRADING, etc.—U. S. Eng., 494 Spring St. N.W., Atlanta, grading, excav. runways, Cobb Co., to W. L. Florence, Powder Springs, **$1,000,000-$5,000,000**.

★†**Georgia**—PLUMBING SYSTEMS—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., plumbing sys., to Buckhead Plumbing & Heating Co., 3051 Peachtree Rd. N.E., Atlanta, **$500,000-$1,000,000**.

†**Georgia** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Post Office Bldg., Savannah, electrical distr. sys. and street lighting, Richmond Co., to Alrich Electric Constr. Co., Augusta, under **$50,000**.

†**Georgia**—HEATING SYSTEM—U. S. Eng., Postoffice Bldg., Savannah, heater room and heating sys., Dougherty Co., to Independent Plumbing Co., 171 Luckie St. N.W., Atlanta, under **$50,000**.

†**Georgia** — HEATING SYSTEM, etc. — U. S. Eng., Postoffice Bldg., Savannah, heating and plumbing sys., Richmond Co., to Hillard Heating & Plumbing Co., Atlanta, under **$50,000**.

★†**Georgia** — IMPROVEMENTS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., imprvs., NOY 5743, to W. C. Shepherd & Griffin Constr. Co., P. O. Box 3299, Atlanta, **$3,506,667**. Awarded 8/8.

†**Idaho**—IMPROVEMENTS—U. S. Eng., Pitock Blk., Portland, Ore., imprvs., placing marking stripes and numerals on runways, Ada Co., to The Sawtooth Co., 710 Front St., Boise, under **$50,000**.

†**Illinois** — ELECTRICAL SYSTEM, etc. — U. S. Eng., 520 Merchandise Mart, Chicago, electrical sys. and floodlighting, Cook Co., to Harmon Electric Co., 724 S. Cicero St., Chicago, under **$50,000**.

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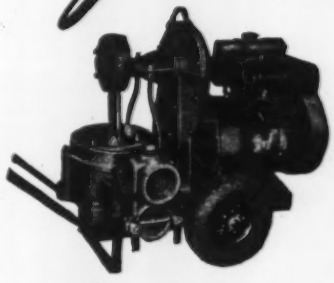

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**Illinois**—GRADING—U. S. Eng., 520 Merchandise Mart, Chicago, grading, Cook Co., to T. M. Madden, 4612 W. Van Buren St., Chicago, under **$50,000.**

†**Illinois**—HEATING LINES—U. S. Eng., 520 Merchandise Mart, Chicago, heating lines, Cook Co., to H. P. Reger & Co., 1501 E. 72 Pl., Chicago, under **$50,000.**

★†**Illinois**—OVERHEAD HANDLING SYSTEM—U. S. Eng., 520 Merchandise Mart, Chicago, overhead handling sys., Cook Co., to American Monorail Co., 13107 Athens St., Cleveland, O., **$500,000-$1,000,000.**

†**Illinois**—PLUMBING—U. S. Eng., 520 Merchandise Mart, Chicago, plumbing, Cook Co., to J. J. Corboy Co., 1128 N. Leamington St., Chicago, under **$50,000.**

†**Illinois**—RAILROAD TRACK FACILITIES—U. S. Eng., Clock Tower Bldg., Rock Island, railroad track facilities, Carroll Co., to Deckert & McDowell, 53 W. Jackson St., Chicago, **$50,000-$100,000.**

†**Illinois**—OIL SYSTEM—U. S. Eng., 612 Federal Bldg., Louisville, **Ky.**, oil storage and dispensing sys., Lawrence Co., to **Austin M.** Snyder, d.b.a. Snyder Constr. Co., Vincennes, Ind., under **$50,000.**

†**Indiana** — SPRINKLER SYSTEM — U. S. Eng., 612 Federal Bldg., Louisville, sprinkler system, Vanderburgh Co., to Blaw-Knox Constr. Co., Farmers Bldg., Pittsburgh, Pa., under **$50,000.**

†**Iowa**—DETECTION SYSTEM—U. S. Eng., 1709 Jackson St., Omaha, Neb., intrusion detection sys., Woodbury Co., to American District Telegraph Co. of Iowa, 155 6 Ave., New York, N. Y., under **$50,000.**

†**Iowa**—FIRE ALARM SYSTEM—U. S. Eng., 1709 Jackson St., Omaha, fire alarm sys., Woodbury Co., to American District Telegraph Co. of Iowa, 155 6 Ave., New York, N. Y., under **$50,000.**

†**Kansas** — IMPROPEMENTS — U. S. Eng., Albuquerque, N. M., imprvs., to Tulsa Rig & Reel Co., Philtower Bldg., Tulsa, Okla.

†**Kansas**—RAILROAD SPUR—U. S. Eng., 10 E. 17 St., Kansas City, Mo., railroad spur, to M. W. Watson, Topeka Bldg., Topeka. Est. over **$100,000.**

★†**Kansas**—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., to List & Clark Constr. Co. and San Orr Constr. Co., McPherson, and to Tulsa Rig. Reel & Mfg. Co. and American Steel Dierrick Co., Philtower Bldg., Oklahoma City, Oklahoma, over **$5,000,000.**

†**Kentucky** — SPRINKLER SYSTEM — U. S. Eng., 612 Federal Bldg., Louisville, sprinkler sys., Jefferson Co., to Rockwood Sprinkler Co., 38 Harlow St., Worcester, Mass., under **$50,000.**

†**Louisiana**—ALARM SYSTEM—U. S. Eng., foot of Prytania St., New Orleans, alarm system, East Baton Rouge Parish, to E. W. Cook Co., Jackson, Miss., under **$50,000.**

†**Louisiana**—ALARM SYSTEM—U. S. Eng., foot of Prytania St., New Orleans, alarm system, Orleans Parish, to E. W. Cook Co., Jackson, Miss., under **$50,000.**

†**Louisiana**—BOAT LANDING—U. S. Eng., foot of Prytania St., New Orleans, crash boat landing addns., Inv. 42-53, to Boh Bros., 2400 Cypress St., New Orleans. Awarded 8/15.

†**Louisiana**—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., foot of Prytania St., New Orleans, electrical distr. sys., Rapides Parish, to Electric Contg. Co., Alexandria, under **$50,000.**

†**Louisiana**—IMPROVEMENTS—U. S. Eng., foot of Prytania St., New Orleans, imprvs., to Barber Bros., Reymond Bldg., Baton Rouge. Est. **$100,000-$500,000.**

†**Maine** — IMPROVEMENTS — U. S. Eng., Park Square Bldg., Boston, imprvs., Inv. 175-42-35, to Warren Bros., 38 Memorial Dr., Cambridge, Mass., **$100,000-$500,000.** Bids 8/12.

†**Maryland** — CONSTRUCTION — U. S. Eng., Standard Oil Bldg., Baltimore, construction, Baltimore Co., to The James Gibbons Co., Relay, **$100,000-$500,000.**

†**Maryland**—IMPROVEMENTS — War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., imprvs., to Goss & Ritchie, Ravenswood, W. Va.

†**Maryland**—IMPROVEMENTS—U. S. Eng., Penn-Mutual Bldg., Phila., Pa., imprvs., drainage, paving, to P. Flanigan & Sons, 2405 Lock Raven Rd., Baltimore.

†**Maryland**—PLANTING, etc.—U. S. Eng., Standard Oil Bldg., Baltimore, planting, mulching, guying and watering trees, Baltimore Co., to State Contg. Co., Inc., 3600 Roland Ave., Baltimore, under **$50,000.**

Massachusetts — IMPROVEMENTS — Industrial company, imprvs., to V. J. Kenneally Co., 104 Hanover St., Boston, **$169,895.**

†**Mississippi** — OIL SYSTEM — U. S. Eng., Courthouse & Postoffice, Vicksburg, oil storage and dispensing sys., Lauderdale Co., to Magnolia Constr. Co., Jackson, under **$50,000.**

†**Mississippi** — RAILROAD SPUR — U. S. Eng., Courthouse & Customhouse, Mobile, Ala., railway spur, to F. S. Neely, Pascagoula, Miss. Est. under **$50,000.**

Miss., Greenwood—AIRPORT—Airport pav. ing. **WPA.** Over **$50,000.**

★†**Missouri**—IMPROVEMENTS—U. S. Eng., P. O. Box 97, Memphis, Tenn., imprvs., deep wells, pumps, gasoline engines, electric motor drives, pump houses, N 1942-42-24F to C. M. Journey, Highway 61, Memphis, Tenn. Est. less than **$1,000,000.**

★†**Missouri**—IMPROVEMENTS—U. S. Eng., P. O. Box 97, Memphis, Tenn., imprvs., water distr., sanitary sewerage sys., 1942-43-32f, to The Waco Co., Inc., and Day-ton, Waco, Tex. Est. less than **$1,000,000.**

†**Montana** — FUELING SYSTEMS, etc. — U. S. Eng., Administration Bldg., Fort Peck, gasoline fueling and oil storage sys., to Central California Const. Co., San Francisco, Calif. Est. over **$100,000.**

†**Nebraska** — SEEDING, etc. — U. S. Eng., 1709 Jackson St., Omaha, seeding, grading, fertilizing, soil control construction, to Roberts Constr. Co., 1018 Term. Bldg., Lincoln. **$50,000-$100,000.**

†**Nevada** — STORAGE FACILITIES — U. S. Eng., Wright Bldg., Sacramento, Calif., concrete, steel storage facilities, to MacDonald & Kahn, Inc., 200 Financial Center Bldg., San Francisco, Calif., **$100,000-$500,000.**

†**New Hampshire** — WHARF — U. S. Eng., Park Square Bldg., Boston, Mass., wharf exten., replacing fender piles, Rockingham Co., to M & R Constr. Co., 148 Border St., Boston, Mass., **$50,000-$100,000.**

†**New Mexico**—GAS DISTRIBUTION FACILITIES, etc.—U. S. Eng., Albuquerque, to Parks, Marshall & McCloskey, 4707 Elsby St., Dallas, Tex., natural gas distr. lines, facilities, **$50,000-$100,000;** water lines, facilities, **$100,000-$500,000;** sanitary sewer lines, **$100,000-$500,000.** Bids 5/29. CD 5/21—ENR 5/21.

†**New Mexico** — GASOLINE FUELING SYSTEMS, etc.—U. S. Eng., Albuquerque, gasoline fueling systems and oil storage, Eddy Co., to De Luca & Son, Inc., 1745 Filbert St., San Francisco, Calif., **$50,000-$100,000.**

†**New Mexico**—RAILROADS—U. S. Eng., Albuquerque, railroads, Santa Fe Co., to Patrick & Prestridge, Albuquerque, under **$50,000.**

†**New Mexico**—GASOLINE SYSTEM—U. S. Eng., Albuquerque, gasoline fueling sys., oil storage, Luna Co., to Flotation Systems, Inc., 4031 Goodwin Ave., Los Angeles, Calif., **$50,000-$100,000.**

†**New York**—COMPASS SWINGING BASE—U. S. Eng., 120 Wall St., New York, compass swinging base, Orange Co., to Cuzzi Bros. & Singer, Inc., 10 S. 2 Ave., Mount Vernon, under **$50,000.**

†**New York**—SPRINKLER SYSTEM—U. S. Eng., 969 Ellicott Square Bldg., Buffalo, sprinkler sys., Niagara Co., to Automatic Sprinkler Corp. of America, Brittain St., Youngstown, O., **$50,000-$100,000.**

N. Y., Grant City — RAILROAD RECONSTRUCTION — Staten Island Rapid Transit Railway Sys., and Transit Comm., 270 Madison Ave., New York, railroad reconstruction, to M. L. Klostergard, 4 Codington Ave., Dongan Hills, **$29,990.**

†**North Carolina**—**IMPROVEMENTS** — Area Eng., Fort Bragg, imprvs., addnl. bldgs., to H. L. Cole, Greensboro. **Awarded 8/10.**

†**North Carolina**—STOCK FENCE—U. S. Eng., 308 Courthouse, Wilmington, stock fence, Wake and Durham Counties, to J. A. Davidson, Raleigh B. and L. Bldg., Raleigh, under **$50,000.**

†**North Carolina**—ALARM SYSTEM—U. S. Eng., 33 Customhouse, Charleston, automatic fire alarm sys., Robeson Co., to American District Telegraph Co., 155 6 Ave., New York, N. Y., under **$50,000.**

★†**Ohio**—APRONS, etc.—U. S. Eng., U. S. Post Office & Courthouse, Cincinnati, concrete apron, runways and taxiway, Franklin Co., to W. L. Johnson Constr. Co. & Associates, Hicksville, **$500,000-$1,000,000.**

†**Oklahoma**—RAILROAD SPUR TRACKS—U. S. Eng., 231 W. Main St., Denison, railroad spur tracks, to Martin & Grace, 710 Rio Grande Natl. Life Bldg., Dallas, Tex., under **$50,000.**

†**Oregon**—GASOLINE SYSTEM—U. S. Eng., Pittock Blk., Portland, gasoline storage and fueling sys., Jackson Co., to Flotation Systems, Inc., 4031 Goodwin Ave., Los Angeles, Calif., under **$50,000.**

†**Oregon**—LIGHTING SYSTEM—U. S. Eng., Pittock Blk., Portland, Ore., lighting sys., Benton Co., to Tice Electric Co., Corvallis, under **$50,000.**

Ore., Astoria—DOCK—Astoria Port Comm., R. R. Bartlett, mgr., 60x450 ft. dock, west side Pier 2, to J. Helstrom, General Delivery, Astoria, **$25,000.** Awarded 8/14.

★†**Rhode Island** — FACILITIES — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., additional facilities, NOY 5586, to James A. Munroe & Sons and Leonard Constr. Co., Inc., 420 Lexington Ave., New York, N. Y. **$9,300,000.**

★†**Rhode Island** — FACILITIES — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, NOY

UNCLASSIFIED (Contracts Awarded, Cont'd.)

4175, to George A. Fuller & Co., 597 Madison Ave., New York, N. Y., and Merritt-Chapman & Scott Corp., 17 Battery Pl., New York, N. Y., $5,110,000.

★†**Rhode Island** — FACILITIES — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Supplementary Agreement 7, addnl. facilities, NOY 4175, to Merritt-Chapman & Scott Corp., 17 Battery Pl., New York, N. Y., and George A. Fuller Co., 597 Madison Ave., New York, N. Y., $15,248,600. Additional to CD 8/18, under CA.

†**South Carolina** — TOWER — U. S. Eng., 33 Customhouse, Charleston, tower erection, clearing, marker construction, Chesterfield Co., to Carl B. Edgeworth, Cheraw, under $50,000.

†**South Carolina**—SPRINKLER SYSTEM—U. S. Eng., 33 Customhouse, Charleston, automatic sprinkler sys., Richland Co., to Piping & Heating Co., Greenville, under $50,000.

†**South Carolina**—STORAGE TANKS—U. S. Eng., 33 Customhouse, Charleston, removal gasoline filling station and installation gasoline storage tanks, Richland Co., to A. Z. Price Co., Inc., Piedmont Bldg., Charlotte, N. C., under $50,000.

†**South Dakota**—FUELING SYSTEM—U. S. Eng., 1709 Jackson St., Omaha, Neb., gasoline fueling and lubricating sys., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. Est. over $100,000.

†**South Dakota** — IMPROVEMENTS — War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., imprvs., to Nelson, Mullen & Nelson, 356 Gateway Bldg., Minneapolis, Minn. $327,464. Stanley Eng. Co., Muscatine, Ia., engrs. CD 7/24—ENR 7/30.

South Dakota — RAILROAD — Chicago & Northwestern R.R., B. R. Kulp, ch. engr., 400 W. Madison St., Chicago, Ill., replacing 60 lb. rails with 90 lb. rails on 17 mi. line between St. Onge and Belle Fourche, rebuilding railroad yards at Belle Fourche, strengthening bridges between Whitwood and Belle Fourche, reballasting road bed, imprv. bridges between Rapids City and Whitwood, own forces.

★†**South Dakota**—RUNWAY, etc.—U. S. Eng., 1709 Jackson St., Omaha, Neb., runway, concrete, paving taxiway and soil stabilization, Davison Co., to Northwestern Engineering Co., Rapid City. $1,000,000-$5,000,000.

†**Tennessee**—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 306 U. S. Courthouse, Nashville, electrical distr. sys., Coffee Co., to Edenfield Electric Co., 517-8 Ave. S., Nashville, under $50,000.

†**Tennessee**—FENCE—U. S. Eng., 306 U. S. Courthouse, Nashville, fence, Coffee Co., to Gardner Constr. Co., McGavock Lane, Nashville, under $50,000.

†**Tennessee**—TANK—U. S. Eng., P. O. Box 97, Memphis, tank, Shelby Co., to I. L. Starkey, Gladewater, Tex., under $50,000.

†**Texas and Oklahoma**—IMPROVEMENTS—U. S. Eng., Box 61, Tulsa, Okla., imprvs., to P. B. Odom Const. Co., c/o Colcord Bldg., Oklahoma City, Okla., and J. H. Erbelding and B. Constantine, Box 61, Tulsa, Okla. $50,000-$100,000 ea.

Texas-Oklahoma—PIPELINE — Texas Pipe Line Co., c/o West Dallas Refinery, Dallas, to N. A. Saigh Constr. Co., Builders Exch. Bldg., San Antonio, laying 30½ mi. 8 in. steel welded joint oil pipeline between Armstrong and Colgate, approx. $105,000; 8¾ mi. between Armstrong and Colgate, approx. $32,000; 35 mi. between Sherman and Armstrong Station north, Tex., approx. $120,000; to W. G. Hanrahan, c/o owners, 39 mi. line between Dallas and McKinney, Tex., approx. $135,000. Awarded 8/17. Grand total $392,000.

†**Texas**—RAILROAD SIDING—U. S. Eng., San Antonio, railroad siding, Bexar Co., to W. A. Smith Constr. Co., 301 Gregg St., Houston, under $50,000.

†**Texas**—SPRINKLER SYSTEM—U. S. Eng., San Antonio, sprinkler sys., Brown Co., to Century Sprinkler Corp., 305 Graham St., Richmond, Va., under $50,000.

Texas—OIL DEVELOPMENT—H. K. Boysen, Tilden, drilling, casing, developing deep crude oil wells, vicinity Tilden, McMullen Co., to Kirkwood & Morgan, Tilden, approx. $77,000. CD 8/19.

†**Texas** — IMPROVEMENTS — U. S. Eng., Citizens Bank Bldg., Denison, imprvs., to Lone Star Mfg. Co., c/o Sheppard Field, Wichita Falls, $100,000-$500,000.

†**Texas**—RAILROADS—U. S. Eng., Albuquerque, N. M., railroads, Presidio Co., to Sharp & Fellows Contg. Co., and Wm. A. Smith Constr. Co., Amarillo, Tex., under $50,000.

†**Texas**—FIRE ALARM and SPRINKLER SYSTEM—U. S. Eng., Citizens Bank Bldg., Denison, fire alarm and sprinkler sys., to W. H. Ladew, Southern Life Bldg., Dallas, under $50,000. Bids 7/9, awarded 8/10. CD 7/2.

†**Texas** — IMPROVEMENTS — U. S. Eng., Denison, imprvs., asphalt paving, to Central Contg. Co. and Nolan Bros. & Wagner, Construction Bldg., Dallas, $100,000-$500,000. W. C. Hedrick, 1005 1st Natl. Bank Bldg., Fort Worth, engr.

With this 8200 H.P. recycling plant at Villa Platte, La., Continental Oil Company recovers gasoline from gas, then pumps the gas back into the oil sand to maintain gas pressure to produce more oil.

WORLD'S LARGEST OIL FIELD CONSERVATION PLANT HOUSED IN

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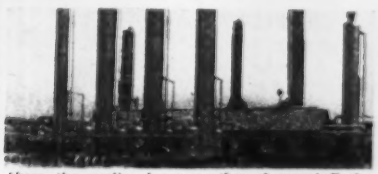

Above, the gasoline house, another of several Butler Steel Buildings housing the world's largest recycling plant.

Above—Interior of lined and heated railway Fruit Handling Depot.

Many refineries are housed in Butler Steel Buildings—some of them insulated and air-conditioned. In the new phase of oil field stabilization large Butler Steel Buildings provide the speedy and economical solution to the housing of recycling equipment. They are just as adaptable for housing synthetic rubber plants if, as and when priority restrictions permit.

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At right — Truck Garage at large Army Depot. Below—Insulated Machine Shop at River Rail Elevator.

Below—Restaurant—typical of Butler Buildings for Wayside and Drive-In enterprises.

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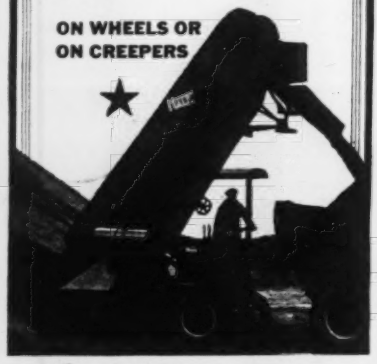

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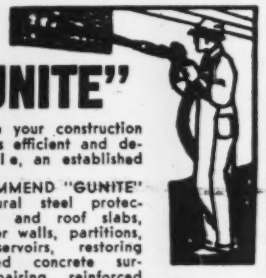

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**Texas** — ELECTRICAL DISTRIBUTION SYSTEM — U. S. Eng., Fort Sam Houston, outdoor overhead electrical distr. sys., Spec. 42-249, to Investment Service Corp., 313 Gr. Natl. Life Bldg., Dallas, under **$50,000.** Bids 8/10. CD 8/7.

†**Texas** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston, outdoor overhead electrical distr. sys., Spec. 42-226, to Graham & Collins, 700 Ave. A, San Antonio, under **$50,000.** Bids 8/3, awarded 8/12.

†**Texas**—FACILITIES, etc.—U. S. Eng., Fort Sam Houston, facilities, air conditioning sys., Spec. 42-253, to Krisch-Delaven Elec. Co., 801 Main Ave., San Antonio. Bids 8/3, awarded 8/15. CD 7/29.

★†**Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., Group C bldgs., to Walsh & Burney, 928 N. Flore St., San Antonio, **$500,000-$1,000,000.** Awarded 8/17. CD 7/23—ENR 7/30, under LB.

†**Texas**—GASOLINE FUELING SYSTEM—U. S. Eng., 25 St. and Ave. F, Galveston, gasoline fueling sys., Hidalgo Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., under **$50,000.**

†**Texas**—RAILROAD SPUR—U. S. Eng., 25 St. and Ave. F, Galveston, addnl. railroad spur, Victoria Co., to W. A. Smith Constr. Co., Inc., 301 Gregg St., Houston, under **$50,000.**

†**Texas** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., San Antonio, electrical distr. sys., Brown Co., to Embry Electric Co., Brady, under **$50,000.**

†**Texas** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., San Antonio, electrical distr. sys., Bexar Co., to Wright Bros. Electric Co., 405 Main Ave., San Antonio, under **$50,000.**

†**Texas** — GASOLINE and LUBRICATING OIL SYSTEM, etc.—U. S. Eng., San Antonio, gasoline and lubricating oil storage and dispensing sys., Val Verde Co., to Flotation Systems, Inc., 4031 Goodwin Ave., Los Angeles, Calif., **$100,000-$500,000.**

†**Texas**—TARGET BUTT, etc.—U. S. Eng., San Antonio, target butt and taxiway, Bexar Co., to J. D. Scarborough, Corpus Christi, under **$50,000.**

Tex., George West—OIL WELL DRILLING—Brewer-Hixon and F. W. Jones, George West, drilling, casing, developing deep crude oil wells, to Rotary Drilling Corp., Milam Bldg., San Antonio, **$70,000.** Est. $100,000.

Tex., Houston—GAS LINES—Housing, Inc., F. Sharp, pres., Esperson Bldg., natural gas distr. lines, force account. About **$25,000.**

†**Utah**—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., to Harrison-Dorman Co., Interurban Bldg., Salt Lake City, **$100,000-$500,000.** Bids 8/11.

†**Virginia**—ALARM SYSTEM—U. S. Eng., 415 P. O. and Court House Bldg., Norfolk, air raid alarm sys., Henrico Co., to Laxton Constr. Co., Charlotte, N. C., under **$50,000.**

†**Virginia** — RECONDITIONING HEATING PLANT—U. S. Eng., 415 P. O. and Court House Bldg., Norfolk, reconditioning heating plant, Norfolk Co., to Hungate & Davenport, 4407 Omohundro Ave., Norfolk, under **$50,000.**

†**Washington**—SPRINKLER SYSTEM, etc.—U. S. Eng., Textile Tower, Seattle, automatic sprinkler sys., valve house, to Viking Automatic Sprinkler Co., 1120 8 Ave. S., Seattle, under **$50,000.**

†**Washington** — LUBRICATING SYSTEM — U. S. Eng., Textile Tower, Seattle, lubricating oil sys., to Hazen & Clark, 417 Welch Bldg., Spokane, under **$50,000.** CD 8/18—ENR 8/20.

†**Wisconsin**—HEATING INSTALLATIONS—U. S. Eng., 408 Federal Bldg., Milwaukee, heating installations, Sauk Co., to Stoehr & Laudon, 1705 W. Claybourn St., Milwaukee, under **$50,000.**

†**Wisconsin** — HEATING, VENTILATING, etc.—U. S. Eng., 408 Federal Bldg., Milwaukee, heating, ventilating and air conditioning sys., Milwaukee Co., to Pflugradt Co., 211 W. Kilbourn Ave., Milwaukee, **$50,000-$100,000.**

†**Wisconsin**—IMPROVEMENTS—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., imprvs., paving, to Milwaukee General Const. Co., 607 W. Mitchell St., Milwaukee. Consoer, Townsend & Quinlan, 211 W. Wacker St., Chicago, Ill., engrs.

Alta., Vulcan—FLYING SCHOOL—Dpt. National Defense for Air, Ottawa, Ont., addnl. accommodations, frame barracks, mess halls, officers quarters, etc., Flying Instructors School, to Waterman-Waterbury Mfg. Co., Ltd., Rose and 7 Sts., Regina, Sask. **$80,000.**

★**B. C., Jericho Beach (Vancouver)**—AIR STATION BUILDING—Dpt. Natl. Defense for Air, Ottawa, Ont., headquarters bldgs. at R.C.A.F. Station, to Carter-Halls-Aldinger Co., Ltd., 670 Taylor Ave., Vancouver. **$1,000,000.**

B. C., Smithers—AIRFIELD ACCOMMODATIONS — Dpt. National Defense for Air, Ottawa, Ont., temporary accommodations, barracks, officer quarters, mess halls, garages, etc., to Tomlinson Constr. Co., Ltd., Somerset Bldg., Winnipeg, about **$200,000.**

★**Man., Gimli**—HANGARS, etc.—Dpt. National Defense for Air, Ottawa, Ont., temporary frame accommodations, 6 double hangar bldgs., to Bird Constr. Co., Ltd., Confederation Life Bldg., Winnipeg, about **$1,250,000.** Additional to CD 7/16—ENR 7/16, under CA.

★**Man., Portage la Prairie**—AIR STATION—Dpt. National Defense for Air, Ottawa, Ont., addnl. temporary accommodations, barracks, officers mess, recreation, admin. bldg., etc. at E.F.T. School, Observers School 7, to Claydon Co., 290 Carry St., Winnipeg, about **$500,000.** —ENR 7/16.

Newfoundland, St. Johns (Torbay)—AIR STATION—Dpt. Natl. Defense for Air, Ottawa, Ont., addnl. temporary frame accommodations at R.C.A.F. Station, to E.G.M. Cape & Co., Ltd., 620 Cathcart St., Montreal, Que. **$180,000.**

N. S., Halifax—AIR DEPOT—Dpt. National Defense, Ottawa, Ont., R.C.A.S.C. Supply depot, to W. G. Foley, St. Albans St. **$50,000.**

Que., Almaville—DAM—Shawinigan Water & Power Co., Ltd., 107 Craig St. W., Montreal, reconstructing dam on St. Maurice River, day labor. **$25,000.**

Que., Rimouski—AIR FORCE BUILDINGS—Dpt. National Defense, Ottawa, Ont., addnl. standard frame barracks, mess halls, drill hall, officer quarters, etc., at C.A. (B) Training Centre, to Newton Constr. Co., Ltd., 356 Victoria St., Sherbrooke, about **$200,000.**

LATIN AMERICA

Mexico — Mexican Government, Scrita de A.P., Mexico, D.F., plans modern maternity hospital home. $310,000.

Mexico, Victoria—Dpt. Communications & P. Wks., Mexico City, receiving bids constructing vehicle road, between Brownsville and McAllen, Tex. to here. **$3,000,000.**

PUBLIC BUILDINGS

PROPOSED WORK

†**Alabama**—Housing Auth. of Mobile, surveys dormitory units. Harry Inge Johnstone, 60 St. Francis St., Mobile, archt. Ladd Engineering Co., Ft. Payne, engrs.

†**Ala., Phenix City**—City, hospital. $250,-142. **FWA.**

★†**Arkansas**—U. S. Eng., Gay Bldg., Little Rock, expan. bldgs., facilities. **$6,000,000.**

†**California**—U. S. Eng., Fresno, bids soon, dormitory type civilian housing.

†**Calif., San Diego** — Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., received no bids Aug. 21, Linda Vista Fire Station. CD 7/29—ENR 8/6.

†**Calif., San Francisco**—Housing Auth. of City and County of San Francisco, 585 Market St., development suspended 150 permanent housing units, Cal.-1-10, for NHA. CD 5/21—ENR 5/28.

★†**Conn., Groton**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., development suspended 1,100 demountable units, Conn. 6018. CD 7/29—ENR 8/6, under CA.

★†**Conn., Stamford**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., development suspended 200 permanent housing units, Conn. 6111. CD 6/16—ENR 6/18, under CA.

†**Ill., Waukegan**—**Federal Security Agency**, 105 W. Adams St., Chicago, recreation bldg. $75,000.

Ind., Franklin — Bd. Comrs. Johnson Co., Franklin, sketches by McGuire & Shook, 1401 Fletcher Trust Bldg., Indianapolis, hospital. $250,000-$300,000. **FWA.**

†**Ind., South Bend**—South Bend Housing Auth., development suspended 248 permanent housing units, Ind.-15-1 and 84 permanent units, Ind. 15-2, for NHA. CD 4/9—ENR 4/16.

★†**Kansas**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, 300 demountable housing units. $1,600,000.

★†**Kansas**—U. S. Eng., Wright Bldg., Tulsa, Okla., hospital. **$3,000,000.** Black & Veatch, 4706 Bway, Kansas City, Mo., engrs.

†**Kansas**—U. S. Eng., Albuquerque, N. M., architect-engineer services by Wilson & Co., Albuquerque, N. M., temporary frame bldgs., electric, water, sewage systems, Finney Co.

†**Kentucky**—U. S. Eng., U. S. Post Office & Courthouse, Cincinnati, O., engineer-architect services by F. W. Garber, 616 Walnut St., Cincinnati, O., temporary frame bldgs., Boyle Co.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Louisiana**—Aluminum Co. of America, ★North Baton Rouge, plant addn. $8,500,000. Federally financed. Additional to CD 3/31—ENR 4/2.

†**La., Shreveport** — Pub. Housing Auth., NHA, Electric Bldg., 7 and Taylor Sts., Fort Worth, Tex., development suspended 192 permanent housing units, La. 2-2. CD 6/8—ENR 6/11.

†**Maine** — Pub. Housing Auth., NHA, 24 School St., Boston, Mass., frame housing units. Over $150,000.

†**Maryland**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., plans by F. L. W. Moahle & Associates, Professional Bldg., Baltimore, temporary bldgs.

†**Md., Leonardtown**—Federal Works Agency, 606 State Planters Bank Bldg., Richmond, Va., addn. St. Mary's Hospital. $95,600.

†**Mass., Boston**—Boston Housing Auth., ★18 Oliver St., Boston, development suspended 549 permanent housing units, Mass. 2-6, for NHA. CD 2/9—ENR 2/12.

†**Minnesota**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., rebuilding bldg., destroyed by fire. $50,000.

†**Mississippi** — U. S. Eng., Courthouse & ★Customhouse, Mobile, Ala., hospital, under $5,000,000.

†**Mississippi** — U. S. Eng., Postoffice & ★Courthouse, Vicksburg, military housing. Less than $3,000,000.

†**Missouri**—U. S. Eng., 10 E. 17 St., Kansas ★City, Mo., plans by Smith, Hinchman & Grylls, Inc., archts. and engrs., 800 Marquette Bldg., Detroit, Mich., mfg. plant expan. Under $3,000,000. CD 8/6—ENR 8/13.

†**Mo., St. Louis**—St. Louis Housing Auth., ★Civil Courts Bldg., development suspended 642 permanent housing units, Mo.-1-3, for NHA. CD 6/12—ENR 6/18.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, architect-engineer services by C. De Leuw & Co., 20 N. Wacker Dr., Chicago, concrete, steel bldgs., Cheyenne Co.

†**Nebraska**—Pub. Housing Auth., NHA, 201 ★N. Wells St., Chicago, Ill., demountable housing units. $600,000.

†**Nebraska**—War Dpt., 20 St. and Constitu- ★tion Ave. N.W., Wash., D. C., military installations. Over $5,000,000.

†**N. J., Bound Brook**—Pub. Housing Auth., ★NHA, 270 Bway., New York, N. Y., suspended development 300 permanent units, N. J.-28053. CD 6/2—ENR 6/4.

†**New Jersey** — U. S. Eng., Penn-Mutual Bldg., Phila., Pa., bids soon conversion hotel into hospital, alterations. J. H. Rankin, Presser Bldg., 1717 Sansome St., Phila., Pa., archt.

†**N. J., Jersey City**—Jersey City Housing Auth., 921 Bergen Ave., Jersey City, suspended development 192 permanent units, N. J.-9-5, for NHA. CD 4/27—ENR 4/30, under CA.

†**New Mexico**—U. S. Eng., Albuquerque, engineer-architect services by Wilson & Co., Albuquerque, temporary frame bldgs., McKinley and Otero Counties.

†**New Mexico**—U. S. Eng., Albuquerque, engineer-architect services by W. C. Kruger, Madrid Rd., Santa Fe, temporary frame bldgs., Otero Co.

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, architect-engineer services by J. Houston Johnston, 393 W. Wesley Rd., Atlanta, Ga., and Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., temporary frame bldgs., New Hanover Co.

†**N. D., Hillsboro** — Traill County Farmers Union Produce Co., milk dehydrating plant, $40,000. Approved and financed by Farm Security Admin. CD 3/17—ENR 3/19 under Industrial Buildings.

†**O., Lorain-Elyria** — Lorain Metropolitan ★Housing Auth., Lorain, suspended development 300 permanent units, Project Ohio 33111, for NHA. CD 7/15—ENR 7/23, under LB.

†**Oklahoma**—U. S. Eng., 1709 Jackson St., Tulsa, architect-engineer services by Victory Archts. & Engrs., Associated, Oklahoma City, temporary frame bldgs., Muskogee Co.

†**Okla., Enid**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., suspended development 65 permanent units, Okla. 34021. CD 7/2—ENR 7/9, under CA.

†**Pa., Emporium**—Emporium Housing Auth., Emporium, frame dwellings for NHA. $250,000 plus.

†**Pa., Monessen**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., suspended development 150 permanent units, Pa. 18-2. CD 7/17—ENR 7/23.

†**R. I., Providence**—Pub. Housing Auth., ★NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., development suspended 278 permanent units. R. I.-1A; 120 permanent units R. I.-1-3. CD 7/23—ENR 7/30.

†**South Carolina**—U. S. Eng., Post Office ★Bldg., Savannah, Ga., bldgs.

†**Tennessee**—U. S. Eng., Chattanooga, permanent hutments.

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

★†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, plans by Freese & Nichols, archts. and engrs., Capps Bldg., Fort Worth, bldgs. for military installation. $1,250,000. CD 7/15—ENR 7/23.

★†**Texas**—U. S. Eng., 231 W. Main St., Denison, plans made addnl. power house for Denison Dam Project, Red River. $2,000,000.

†**Texas**—U. S. Eng., Fort Sam Houston, bids soon, bldg., incl. utilities, roads, walks, Spec. 42-313. Plans deposit $25.

★**Tex., Austin**—State, $2,000,000 bond election Nov. 2 rein.-con., steel, masonry state office bldg., near State Capitol.

★†**Tex., Corpus Christi**—City and Nueces Co., bids soon foundations, for 4 hospital bldgs., facilities, Tex. 41-230. Total est. $1,500,000. **FWA.** Former contract abandoned. CD 4/1—ENR 11/4/41.

★† **Tex., Freeport**—Pub. Housing Auth., NHA, Electric Bldg., 7 and Taylor Sts., Fort Worth, suspended development 300 demountable units, Tex. 41134. CD 5/26—ENR 5/28.

†**Tex., Fort Worth**—Fort Worth Housing Auth., suspended development 22 permanent units Tex. 4-1R; 50 units Tex. 4-1A, for NHA. CD 3/9 and 4/22—ENR 3/12 and 4/30.

Tex., Texarkana—Spring Lake Park School Dist., c/o F. Morre, supt., Texarkana, plans by H. W. Horner, 411 State Line Ave. school. $150,000. FWA funds applied for.

★†**Va., Radford-Pulaski** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts., N.W., Wash., D. C., suspended development 300 demountable units, Va. 44165. CD 7/29—ENR 8/6.

†**Washington** — U. S. Eng., Textile Tower, Seattle, housing facilities.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, storage bldgs.

†**W. Va., Morgantown**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts., N.W., Wash., D. C., suspended development 100 permanent units, W. Va. 46023. CD 7/8—ENR 7/16, under LB.

†**W. Va., Point Pleasant**—Federal Works Agency, 606 State Planters Bldg., Richmond, Va., hospital, health clinic, nurses' home. $244,200.

†**Wis., Sturgeon Bay** — Federal Security Agency, 105 W. Adams St., Chicago, Ill., federal recreation bldg. or remodeling.

†**Pacific Northwest** — U. S. Eng., Textile Tower, Seattle, Wash., housing facilities, Inv. 115.

†**Pacific Northwest**—U. S. Eng., 800 3 Ave., Seattle, Wash., bldgs., Proj. 119.

B. C., Vancouver—Dominion Govt., Ottawa, Ont., developing Deadmans Island for base for Royal Canadian Naval Volunteer Reserve $75,000 bldgs. $150,000. Dpt. Naval Affairs, Ottawa, Ont., archts. Dpt. Munitions & Supply, Ottawa, Ont., engrs.

North West Territory, Watson Lake—Secretary Dpt. Transport, Ottawa, Ont., bids soon, bldgs., barracks, mess halls, etc., for U. S. Ferry Service. $375,000.

Ont., Hamilton—Secretary Dpt. Munitions & Supply, Ottawa, bids soon Naval Training School, altering 115x180 ft., 35x120 ft. and 35x90 ft. warehouse bldgs. for Dpt. National Defense for Sea. $175,000. CD 8/20.

Ont., Moosonee — Land & Forest Dpt., Toronto, bids soon initial steam-dried lignite plant, Moosonee area. $337,000 incl. equip.

Ont., Onakawana—Provincial Govt., c/o Temiskaming & Northern Ontario Ry. Comm., S. B. Clement, ch. engr., bids soon, North Bay, 35x60x80 ft. boiler and processing bldg., water tank, housing, garage, etc., at lignite treatment plant. $200,000.

★**Ont., Ottawa**—Wartime Housing Ltd., 55 York St., bids early September 250-300 houses, Ottawa South. $650,000-$750,000.

Ont., Rockcliffe—Dominion Govt., Ottawa, plans by Dpt. Air Defense, Ottawa, hospital at airport. $150,000. Dpt. Munitions & Supply, Ottawa, engrs.

BIDS ASKED

Bids Asked August 31

†**Massachusetts**—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I. (selected bidders), storage and instruction bldgs.

★†**Pa., Pittsburgh** — Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 400 permanent housing units, Pa. 36104. CD 8/11—ENR 8/13, under BA.

Bids Asked September 8

†**N. Y., Watertown**—House of Good Samaritan, 832 Washington St., 2 story, bsmnt., 46x170 ft. masonry wall, brick facing, hospital. $100,000. **FWA.** Adv. ENR 8/27. CD 5/4—ENR 5/7.

Bids Asked September 9

†**Wash., D. C.**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts., N.W., Wash., D. C., suspended development 300 demountable units, Va. 44165. CD 7/29—ENR 8/6. housing units, D.C.-1-12. Louis [illegible], 1223 Connecticut Ave., archt.

Bids Asked September 10

†**Conn., Groton**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., 300 [illegible] units, Conn. 6141. CD 8/4—ENR 8/[illegible]

Bids Asked September 14

★†**N. Y., Buffalo** — Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., [illegible] permanent housing units, N.Y. 3[illegible] CD 7/9—ENR 7/11.

Bids Asked September 15

★†**Pa., Phila.**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., [illegible] permanent housing units, Pa. 36254. CD 8/14—ENR 8/20.

Bids Asked September 17

†**Pennsylvania** — Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., housing, Pa. 36265. Extended date. CD 8/3—ENR [illegible]

Bids Asked September 18

★†**Pa., Coatesville** — Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 340 permanent housing units, Pa. 36272, and 50 permanent units, Pa. 36273. CD 7/21—ENR 7/23.

Bids Asked September 24

N. Y., Hudson—Comr. Social Welfare, 112 State St., Albany, Spec. 11411, New York State Training School for Girls. Extended date. Plans deposit $5. CD 6/18—ENR 6/25.

N. Y., Oswego—Comr. Bd. Educ., State Education Bldg., Albany, reconstruction and electrical work, Anditorium and Gymnasium Building 1, State Teachers College. Plans deposit $10 construction, and $5 electrical work.

Bids Asked September 29

★†**New Jersey**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., housing, N.J. 28044. Extended date. CD 8/3—ENR 8/6.

Bids Asked October 6

★†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, housing, Pa. 36258. Extended date. CD 8/10—ENR 8/13.

Bids Asked

†**Arizona**—U. S. Eng., Albuquerque, N. M., military housing. $150,000. CD 7/22—ENR 7/30.

†**Arizona**—U. S. Eng., Phoenix, crash truck garage, etc. Plans deposit $25.

†**Massachusetts** — U. S. Eng., Park Square Bldg., Boston (selected bidders), housing.

★†**Texas**—U. S. Area Engineer, Camp Bowie, frame bldgs. $750,000 or more. Plans deposit $50.

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-314. Plans deposit $25.

†**Texas**—U. S. Eng., Fort Sam Houston, housing, etc. Spec. 42-304. Plans deposit $25.

LOW BIDDERS

†**Maryland**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., bldg. annex, from H. B. Alexandria, Harrisburg, Pa.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, addnl. frame bldgs., from Skyline Builders, Inc., 522 Ave. J, Dallas, $100,000-$500,000. CD 8/13—ENR 8/20.

†**Texas**—U. S. Eng., Fort Sam Houston, Aug. 17, bldg., roads, walks, utilities, Spec. 42-288 (A3-11), from Hawley & Riley, 523 Donaldson Ave., San Antonio.

†**Texas**—U. S. Eng., Fort Sam Houston, Aug. 15, military housing, Spec. 42-278, (T1-16), from J. H. Rayburn, 326 Funston Ave., San Antonio. CD 8/11.

†**Texas**—U. S. Eng., Fort Sam Houston, about Aug. 12, bldgs., roads, walks, utilities, Spec. 42-287(A 2-26), from Chas. H. Oehler, 5007 Bway., Galveston. CD 8/10.

★†**Virginia**—U. S. Eng., Staunton, Aug. 17, Woodrow Wilson General Hospital, from Jeffress Dyer, Inc., 1741 K St. N.W., Wash., D. C., $1,000,000-$5,000,000.

†**Washington** — Vancouver Housing Auth., City Hall, Vancouver, Aug. 12, admin. bldg., community house, health bldg., maintenance shops for housing, for NHA, from A. T. Beckett, Bd. Trade Bldg., Portland, Ore., $271,585. Est. $250,000. CD 8/6.

CONTRACTS AWARDED

★†**Alabama**—Defense Plant Corp., 811 Vermont Ave., Wash., D. C., plant, to H. K. Ferguson Engineering Co., Hanna Bldg., Cleveland, O., $750,000.

★†**Arkansas**—U. S. Eng., Gay Bldg., Little Rock, bldg., addns., imprvs., to Manhattan Constr. Co., Ft. Smith. Est. over $5,000,000.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Arkansas**—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., temporary frame bldgs., Desha Co., to Newton & Glenn Hattiesburg, Miss., **$100,000-$500,000.**

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, temporary frame bldgs. Ventura Co., to Donald F. Shaw, 2984 Alessandro St., Los Angeles, **$100,000-$500,000.**

★†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, hospital group, to Griffith Co., 502 Los Angeles Railway Bldg., Los Angeles, under **$1,000,000.** Awarded 8/15.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., to Emil Person, 829 San Luis Road, Berkeley, under **$1,000,000.** Awarded 8/13.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, battery charging bldg., to Whalin Bros., 2942 23 Ave., Oakland, under **$1,000,000.** Awarded 8/13.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, military housing, to G. W. Williams Co., 10 California Dr., Burlingame, under **$1,000,000.** Awarded 8/14.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, housing, to Doudell Constr. Co., Box 488, San Jose, under **$1,000,000.** Awarded 8/14.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, bldgs., facilities, Spec. 163, to W. Douglas Lee Co., 401 S. Rossmore Ave., Los Angeles, over **$100,000.** Awarded 8/14.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, chemical warfare bldg., to Paul C. Gibson, 372 Velarde St., Mountain View. Awarded 8/20.

★†**California**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S. A. 2, addnl. facilities, NOY 5125, to Barrett & Hilp, 918 Harrison St., San Francisco, **$4,038,120.** Awarded 8/6. Additional to CD 5/19—ENR 5/27, under CA.

†**Colorado**—U. S. Eng., c/o Postmaster, Denver, hospital boiler plant and steam distr. sys., Eagle Co., to Lym Engineering Co., Salt Lake City, Utah, **$100,000-$500,000.**

†**Colorado** — U. S. Eng., c/o Postmaster, Denver, concrete, steel bldgs., Denver Co., to H. K. Ferguson Co., Hanna Bldg., Cleveland, O., **$100,000-$500,000.**

†**Connecticut** — Industrial Company, brick, steel plant expan., etc., to Harry Maring, Jr., Inc., 530 Lindley St., Bridgeport. Est. **$145,000.** Federally financed. CD 7/22—ENR 7/30.

†**Delaware**—U. S. Eng., Penn-Mutual Bldg., Phila., Pa., temporary frame bldgs., New Castle Co., to Barlow-Meagher Co., Inc., 101 Park Ave., New York, N. Y., **$100,000-$500,000.**

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, removal and delivery bldgs., utilities, Inv. Neg.-W.P.B.-43-1, to Scott-Whiteaker Co., 3100 N.W. 27 Ave., Miami, under **$1,000,000.** Awarded 8/12.

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, bldgs., alterations, Inv.-Neg.-Jax-43-3, to Watt & Sinclair, 207 Royal Palm Way, Palm Beach, under **$1,000,000.** Awarded 8/9.

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, office bldg., Inv.-Neg.-K.E.-43-1, to Stevens & Sipple, Orlando, under **$1,000,000.** Awarded 8/11.

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, bldgs., Inv.-Neg.-Jax-43-83, to Paul Miller Constr. Co., Leesburg, under **$1,000,000.** Awarded 8/12.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, temporary frame bldgs., Marion Co., to John W. Knope, Ocala, **$100,000-$500,000.**

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, temporary frame bldgs., Osceola Co., to Stevens & Sipple, Orlando, **$100,000-$500,000.**

★†**Florida** — U. S. Eng., Courthouse and Postoffice, Jacksonville, bldg., to G. A. Hanson Co., Tampa, under **$1,000,000.** Awarded 8/14.

★†**Florida** — U. S. Eng., Courthouse and Postoffice, Jacksonville, bldgs., etc., Inv. Neg.-Jax-43-93, to T. H. Radford Const. Co., Live Oak, under **$1,000,000.** Awarded 8/14.

†**Georgia**—U. S. Eng., Postoffice Bldg., Savannah, bldgs., to Farquhar McRae, Arcade Bldg., Savannah.

†**Georgia**—U. S. Eng., Chysler Bldg., Atlanta, radio bldg., to J. J. Black & J. S. Shaw, 161 Spring St. N.W., Atlanta.

†**Illinois**—U. S. Eng., 612 Federal Bldg., Louisville, Ky., temporary frame bldgs., Lawrence Co., to Gordon S. Gundling, 64 W. Randolph St., Chicago, **$100,000-$500,000.**

†**Illinois**—U. S. Eng., 520 Merchandise Mart, Chicago, temporary frame bldgs., Cook Co., to H. F. Friestedt Co., 520 N. Michigan Ave., Chicago, **$100,000-$500,000.**

†**Kansas**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., temporary frame bldgs., Saline Co., to Johnson, Peterson, Busboom & Rauh, Salina, **$100,000-$500,000.**

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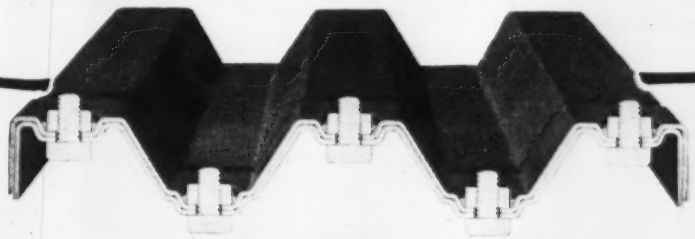

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PUBLIC BUILDS. (Contracts Awarded, Cont'd.)

★†**Kansas**—U. S. Eng., Albuquerque, N. M., temporary frame bldg., Finney Co., to Tulsa Rig, Reel & Mfg. Co., and American Steel Derrick Co., Philtower Bldg., Oklahoma City, Okla., **$1,000,000-$5,000,000.**

★†**Kansas**—U. S. Eng., Albuquerque, N. M., temporary frame bldgs., Ford Co., to Tulsa Rig, Reel & Mfg. Co., and American Steel Derrick Co., Philtower Bldg., Tulsa, Okla., **$1,000,000-$5,000,000.**

†**Maryland**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., guest house, to J. D. Hedin Constr. Co., 820 Mich. Ave. N.E., Wash., D. C.

†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, military housing, Inv. 175-43-29, to Harty-Blaney Constr. Co., 25 Huntington Ave., Boston. Est. over **$150,000.** Bids 8/10. CD 8/7—ENR 8/13.

†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, temporary housing units, 175-43-Neg. 30, to John Bowen Co., 129 Newbury St., Boston. Est. over **$150,000.** Bids 8/12.

★†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, housing, Inv. 175-43-Neg. 36, to F. Grande & Sons Constr. Co., 425 Bway., Everett. Est. under **$1,000,000.** Bids 8/15. CD 8/14—ENR 8/20.

†**Michigan** — U. S. Eng., 520 Merchandise Mart, Chicago, Ill., temporary frame bldgs., Calhoun Co., to Miller-Davis Co., Kalamazoo, **$100,000-$500,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, 14 theatre of operations bldgs., Wayne Co. to Sorensen Gross Constr. Co., Flint, under **$1,000,000.**

★†**Michigan**—Russell Engineering Co., engr., 607 Shelby St., Detroit, superstructure for plant, to Consolidated Constr. Co., 9 South Clinton St., Chicago, Ill. est. **$500,000;** engine test cells, to F. H. Martin Constr. Co., 955 E. Jefferson Ave., Detroit, est. **$250,000.** Federally financed. CD 7/15—ENR 7/9.

†**Mississippi** — U. S. Eng., Courthouse & Customhouse, Mobile, Ala., temporary frame bldgs., Forrest Co., to Shuptrine Constr. Co., Centreville, **$100,000-$500,000.**

★†**Mississippi**—U. S. Eng., 306 Courthouse, Nashville, Tenn., bldgs., Inv. 40-132, to J. A. Kelly Co., Nashville, Tenn. Est. under **$1,000,000.**

★†**Missouri** — Industrial Company, frame bldgs., etc., to Fruin-Colnon Contg. Co., 408 Olive St., St. Louis. Est. over **$500,000.** Defense Plant Corp. will finance. Additional to CD 1/23—ENR 1/29, under CA.

†**New Jersey**—U. S. Eng., 120 Wall St., New York, N. Y., bldgs., to Charles Christensen & Son, 360 Woodlawn Ave., Jersey City.

†**New Jersey**—U. S. Eng., 120 Wall St., New York, N. Y., storage bldgs., to Frank Briscoe Co., Inc., 287 S. 19 St., Newark, over **$75,000.**

†**New Jersey**—U. S. Eng., Penn-Mutual Bldg., Phila., Pa., warehouse, to Andrew Christensen, 1140 E. Jersey St., Elizabeth.

★†**New Jersey**—U. S. Eng., Penn-Mutual Bldg., Phila., Pa., bldgs., reservoir, etc., to Censullo-Burke Constr. Co., 613 15 St., Union City, over **$500,000.**

★†**New Jersey**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S. A. 5, addnl. facilities, NOY 4676, to Wigton Abbott Corp., and Mahony-Troast Constr. Co., 1225 South Ave., Plainfield. **$2,630,000.** Awarded 8/8. Additional to CD 5/1—ENR 5/7, under CA.

†**New Mexico** — U. S. Eng., Albuquerque, temporary frame bldgs., Eddy Co., to E. S. McKittrick Co., 7839 Santa Fe Ave., Huntington Park, Los Angeles, Calif., **$100,000-$500,000.**

★†**New Mexico**—U. S. Eng., Albuquerque, temporary frame bldgs. and steam distr. sys., Santa Fe Co., to Bradbury & Marchant, Albuquerque, **$1,000,000-$5,000,000.**

†**New York**—U. S. Eng., 960 Ellicott Square Bldg., Buffalo, brick bldgs., Erie Co., to C. H. Everitt, Inc., 295 Auburn Ave., Buffalo, **$100,000-$500,000.**

†**New York**—U. S. Eng., 960 Ellicott Square Bldg., Buffalo, temporary frame bldgs., Jefferson Co., to The John W. Cowper Co., Inc., Sidway Bldg., Buffalo, **$100,000-$500,000.**

†**New York**—U. S. Eng., 960 Ellicott Square Bldg., Buffalo, temporary frame bldgs., Niagara Co., to Walter S. Johnson Bldg. Co. Inc., Niagara Falls, **$100,000-$500,000.**

†**North Carolina**—U. S. Eng., 308 Custom house, Wilmington, temporary frame bldgs., Cumberland Co., to H. L. Coble, Greensboro, **$100,000-$500,000.**

★†**North Carolina**—U. S. Eng., Charlotte, bldgs., to Grannis, Higgins, Thompson & McDevitt, Builders Bldg., Charlotte, **$1,000,000-$5,000,000.**

†**North Carolina** — U. S. Eng., Charlotte, cafeteria M-118, to Southeastern Constr. Co., 218 W. 2 St., Charlotte. Bids 8/14.

★†**North Carolina** — Wilmington Housing Auth., Wilmington, housing, Project N.C. 31029, for NHA, to V. P. Loftis, Builders Bldg., Charlotte, about **$1,800,000.** Lynch & Foard, 202 Princess St., Wilmington, archts.

★†**Ohio**—Industrial Company, brick, steel rein.-con. bldgs., to S. N. Nielsen Co., 3059 W. Augusta St., Chicago, Ill. Est. approx. **$500,000.** Federally financed. Giffels & Vallet, 1000 Marquette Bldg., Detroit, Mich., engrs.

†**Ohio**—U. S. Eng., U. S. Post Office & Courthouse, Cincinnati, temporary frame bldgs., Hamilton Co., to Guenther-Reinhard Co., 2023 Dunlap St., Cincinnati, **$100,000-$500,000.**

†**Ohio**—U. S. Eng., Wright Field, Dayton, temporary frame bldgs., Montgomery Co., to J. H. Marchbank Constr. Co., 205 W. Wacker Drive, Chicago, Ill., **$100,000-$500,000.**

★†**Oklahoma**—Continental Oil Co., Ponca City, 2 plants, one **$2,400,000,** other **$2,600,000,** force account, Defense Plant Corp. will finance. CD 5/12—ENR 5/14.

★†**Oklahoma**—Reconstruction Finance Corp., 811 Vermont Ave. N.W., Wash., D. C., plant, to Brown & Bellows, Greenwood and Industrial Blvd., Houston, approx. **$4,200,000.** Awarded 8/12.

†**Oklahoma**—U. S. Eng., 231 W. Main St., Denison, Tex., addnl. housing, to Rausner-Wolfe & Jackson, Dallas, approx. **$325,000**

★†**Oklahoma**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, NOY 5490, to Norman Constr. Co., Cowen-Norton Constr. Co., and Tankersley Constr. Co., P. O. Box 1414, Oklahoma City, **$10,877,000.** Additional to CD 7/7, under CA.

†**Pennsylvania**—Industrial Company, brick, concrete mfg. plant, yard storage facilities, railroad trackage, etc., to H. K. Ferguson Co., 659 Hanna Bldg., Cleveland, O. Defense Plant Corp. will finance.

†**Pennsylvania**—U. S. Eng., 6 and Walnut Sts., Phila., temporary frame bldgs., Berks Co., to Ritter Bros., 1511 N. Cameron St., Harrisburg, **$100,000-$500,000.**

★†**Pennsylvania**—Yards & Docks, Navy Dpt., Wash., D. C., addnl. aviation facilities, Naval Aircraft Factory, Navy Yard, NOY 5386, to Golder Constr. Co., Inc., Market St. Natl. Bank Bldg., **$1,540,000.**

★†**Pennsylvania**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S. A. 2, addnl. facilities, NOY 5200, to Brann & Stuart Co., 1447 Broad St. Station Bldg., Phila., **$6,302,000.** Additional to CD 5/13—ENR 5/27, under CA.

★†**Rhode Island**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S. A. 2, addnl. facilities, NOY 5344, to O. Ahlborg & Son, Inc., 97 Franklin Rd., Cranston, **$803,460.** Awarded 8/11. Additional to CD 6/16, under CA.

★†**Rhode Island**—U. S. Eng., 819 Industrial Trust Bldg., Providence, frame housing units, to H. V. Collins, 7 Dyer St., Providence, and Coleman Constr. Co., 318 Turks Head Bldg., Providence. Est. under **$1,000,000.** Bids 8/19—CD 8/14.

†**South Carolina**—U. S. Eng., 33 Customhouse Charleston, temporary school bldg., to Avery Lumber Co., Sumter.

†**South Carolina**—U. S. Eng., Fort Jackson, bldgs., to W. M. Fine, Spartanburg, **$100,000-$500,000.** Bids 8/11.

★†**South Carolina**—U. S. Eng., 33 Customhouse, Charleston, temporary frame bldgs., electric, water, sewage sys., Horry Co., to J. C. Heslep Co., Caro Bank Bldg., Columbia, **$500,000-$1,000,000.**

★†**South Carolina** — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S. A. 1, addnl. facilities, NOY 5404, to V. P. Loftis Co., 201 Builders Bldg., Charlotte, N. C., **$1,417,000.** Awarded 8/10. Additional to CD 5/19, under CA.

†**South Dakota**—U. S. Eng., 1709 Jackson St., Omaha, Neb., temporary frame bldgs., to Henry Carlson Co., 110 E. 10 St., Sioux Falls. Est. less than **$500,000.** CD 8/13—ENR 8/20.

†**Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, temporary frame bldgs., to J. A. Kelly Co., 1419 Church St., Nashville.

†**Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, temporary frame bldgs., Montgomery Co., to N. E. Yearwood Co., 1701 Church St., Nashville, **$100,000-$500,000.**

†**Tennessee** — U. S. Eng., 306 Courthouse, Nashville, temporary frame bldgs., Montgomery Co., to Whittenberg Constr. Co., 2214 S. Floyd St., Louisville, Ky., **$100,000-$500,000.**

†**Texas**—U. S. Eng., Albuquerque, N. M., temporary frame bldgs., El Paso Co., to J. E. Morgan & Sons, 210 N. Campbell St., El Paso, **$100,000-$500,000.**

★†**Texas** — Industrial Company, plant, to Tellepsen Constr. Co., 3910 Clay St., Houston, approx. **$10,000,000.** Federally financed.

†**Texas** — Texas Electric Steel Co., Bringhurst and Gillespie Sts., Houston, plant annex, day labor and sub-contracts, $600,000. Defense Plant Corp. will finance. ENR 5/14.

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-260, to G. Falbo Co., S. San Saba St., San Antonio, under **$50,000.** 8/17. CD 8/5—ENR 8/13.

★†**Texas**—U. S. Eng., San Antonio, temporary frame bldgs., Brown Co., to Rex D. Kitchens Constr. Co., 608 W. Monroe St., Austin, **$1,000,000-$5,000,000.** CD 8/19.

★†**Texas**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., housing facilities, NOY 5676, to Brown-Lane Co., 1475 Crockett St., Beaumont, $350,000. CD 7/29.

★†**Virginia**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., S. A. 4, NOY 4349, addnl. facilities, to McLean Contg. Co., 1301 Fidelity Bldg., Baltimore, Md., **$3,388,000.** Awarded 8/10. Additional to CD 5/13, under CA.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, warehouse and storage bldgs., to C. M. Ludberg Co., W. 326 1 Ave., Spokane, $160,000-**$500,000.**

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, Wash., standby power plant, Pierce Co., to J. F. Graham, Tacoma, $50,000-**$100,000.**

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, temporary frame bldgs., Snohomish Co., to Gaasland Constr. Co., 1163 Ellis St., Bellingham, **$100,000-$500,000.**

★†**Washington**—U. S. Eng., 800 3 Ave., Seattle, housing facilities, to F. J. Twaits Co., 451 S. Boylston St., Los Angeles, Calif., $500,-**000-$1,000,000.**

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, temporary frame bldgs., Spokane Co., to Clyde M. Ludberg Co., 326 1 St., Spokane. **$100,000-$500,000.**

†**Washington** — U. S. Eng., Textile Tower, Seattle, power plant, to J. F. Graham, 801 Ainsworth, Tacoma, **$50,000-$100,000.**

†**Wisconsin**—Industrial Company, altering factory to Lindemann Constr. Co., 4724 5 Ave. Defense Plant Corp will finance.

†**Wisconsin**—Industrial Company, remodeling, rebuilding plants, to Walker Bros., Inc., 6 Platt St., Eau Claire. Federally financed. CD 7/21—ENR 7/23.

†**Wisconsin**—Industrial Company, design and construction steel, brick factory addn., concrete fdn., to Austin Co., 510 N. Dearborn St., Chicago, Ill., Defense Plant Corp. will finance. CD 4/28—ENR 4/30.

†**Wisconsin**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., bldgs., to J. H. Findorff & Son, Madison.

†**Wisconsin** — Industrial Company, heating and ventilating in Bldgs.30 and 35, to M. J. Corboy, 405 S. Desplaines St., Chicago, Ill. Defense Plant Corp. will finance.

Alta., Calgary — Calgary General Hospital, hospital addn., to Buchan Constr. Co., Ltd., 1306 11 Ave. W., Calgary, **$196,859.** Bids 8/10. CD 8/6.

B. C., Prince Rupert—Dpt. National Defense, Ottawa, Ont., bldgs. for training center, to W. C. Wells, Wilkie, Sask., about **$300,000.**

N. S., Halifax—Dpt. National Defense, Ottawa, Ont., temporary bldgs., to Brookfield Constr. Co., Ltd., 169 Hollis St. **$150,000.**

Ont., Hamilton—Wartime Housing Ltd., 55 York St., Toronto, 2 story, 66x188 ft. frame main bldg., four 2 story 32x170 dormitories, for Women's Communal Centre, to E. H. Yates Constr. Co., 400 Wellington St. N., Est. **$250,000.** CD 7/22—ENR 8/6.

Ont., Ottawa—Dpt. Pub. Wks., Ottawa, annex Ottawa Civic Hospital, Carling Ave., to Ross-Meagher, Ltd., 7 Echo Dr., Est. **$300,000.** Bids 8/5. C. D. Sutherland, c/o owner, archt. CD 7/22—ENR 7/30.

Ont., Peterboro—Wartime Housing Ltd., 55 York St., Toronto, Ont., addnl. 125 houses, to Eastwood Constr. Co., Ltd., Dominion Bank Bldg., George St., about **$175,000.**

Que., Cherrier (St. Paul L'Ermite)—Wartime Housing Ltd., 55 York St., Ottawa, Ont., 2 women's community bldgs., to Corporation Management, Ltd., 465 St. John St., Montreal, about **$200,000.**

COMMERCIAL BUILDINGS

PROPOSED WORK

★**Calif., Lynwood**—L. B. Gibbs, 2905 Lombardy Rd., Pasadena, plans nearing completion by H. J. Bissner, 595 E. Green St., Pasadena, 500 frame, stucco dwellings. Over $1,000,000.

Me., Portland—Realty Operating Co., S. G. Chason, 477 Congress St., 32 unit frame housing. $150,000.

COMMERCIAL BLDGS. (Proposed Work, Cont'd.)

Pa., Latrobe—Vanadium Alloy Steel Co., R. C. McKenna, pres., Latrobe, plans by Sorber & Hoone, 711 1st Natl. Bank Bldg., Greensburg, bids soon, 2 story, bsmnt., 40x70x100 ft. brick, rein.-con. office and laboratory bldg.

Tex., Fort Worth—Loffland & Luther, Edgefield and Oaklawn Dr., bids soon, forty-two, 1 story, frame dwellings. $150,000.

Tex., Fort Worth—Ridglea Development Co., Inc., 6200 Locke St., bids soon, 35 frame dwellings. $150,000.

★**Wash., Seattle** — Superior Homes, Inc., 10855 First Ave. S., Seattle, 500 houses. $2,500,000. L. Baeder, Smith Tower, archt.

CONTRACTS AWARDED

Calif., San Leandro—Noel Gaubert, 4735 Brookdale Ave., Oakland, seventy-three 1 story frame residences. Owner builds. **$292,000.**

Calif., Vallejo—James Jansen, 3833 Franklin Blvd., Sacramento, addnl. 41 homes, east of Tuolumne St. and north of Springs Rd. Owner builds. Est. **$160,000.**

Conn., Manchester—Cottage Homes, Inc., Woodridge Tract, Jarvis St., 117 homes, own forces. **$470,000.**

Conn., Plainville—Metropolitan Homes, c/o Keith S. Heine, 101 Mohawk Dr., West Hartford, forty 1 story homes, to Joseph M. Howard, 46 Maplewood Ave., West Hartford. Est. over **$150,000.**

★**Del., Wilmington**—A. P. Miller, 3333 Arctic Ave., Atlantic City, N. J., 2 story bldg., 166 dwelling units, Lancaster Ave. Owner builds. Est. **$780,000.** W. R. Morton Keast, Commonwealth Bldg., Phila., Pa., archt.

★**Mass., Springfield**—Freeman & Gerla, 551 5 Ave., New York, N. Y., one hundred fifty 1 story, 24x29 ft. frame housing units, Berkshire Ave. Owner builds. **$500,000.** CD 7/29—ENR 8/6.

Neb., Wahoo—Victory House, Inc., J. C. Todd, secy., 405 1st Natl. Bank Bldg., Lincoln, 100 houses, day labor. **$300,000.**

Pa., Duquesne—R. H. Loether, 4146 Clairton Blvd., Pittsburgh, sixty-five 1½ story, bsmnt., 24x36 ft., brick veneer, frame residences. Owner builds. **$312,000.** A. A. Bloch, White Oak Court, Pittsburgh, archt.

Pa., Pittsburgh—John Dach Corp., J. M. Dach, in charge, 1118 Greentree Rd., Greentree, Pittsburgh, one hundred 1½ story, bsmnt., 24x30 ft. frame prefabricated residences, Kennedy Twp., Allegheny Co., separate contracts. **$450,000.**

★**Pa., Pittsburgh**—Hamilton Homes, F. A. Baldus, owner, Magee Bldg., Pittsburgh, one hundred fifty 1½ story, bsmnt., 24x30 ft. frame, prefabricated residences, Kennedy Twp., Allegheny Co., separate contracts. **$675,000.**

Tex., San Antonio—Hilltop Terraces, Inc., Funston St., twenty-three 2 story apartment bldgs., force account. Approx. **$245,000.** Awarded 8/18. CD 8/13—ENR 8/20.

INDUSTRIAL BUILDINGS

PROPOSED WORK

California—WAREHOUSE—Moore Dry Dock Co., foot Adeline St., Oakland warehouse.

Ga., Columbus — COLD STORAGE — Nehl Corp., 1000 9 Ave. plans by T. Firth Lockwood, Murrah Bldg., 2 story, brick cold storage bldg., 1105 10 Ave. $45,000.

Massachusetts—WAREHOUSE, etc.—Bethlehem Steel Co., East Howard St., Quincy, soon lets contract concrete warehouse, garage. $40,000.

Mass., Worcester—BUS TERMINAL—Short Line Bus Co., K. W. Towle, 60 Foster St., brick, steel bus terminal and storage garage, Union and N. Foster Sts. $50,000.

O., Cuyahoga Falls — FACTORY — Akron Presform Mold Co., 2038 S. Main St., Akron, factory. Over $40,000.

Pennsylvania—PLANT—Aluminum Co. of America, Gulf Bldg., Pittsburgh, rehabilitation mfg. plant.

Pennsylvania — PLANT — Aluminum Co. of America, Gulf Bldg., Pittsburgh, conversion mfg. plant.

Tex., Sweeney — PLANT — Abercrombie Oil Co., Gulf Bldg., Houston, bids soon, addnl. brick, rein.-con. bldgs., laboratory, gas storage bldgs., change and tool houses, etc. $100,000.

★**Wash., Bellingham** — PLANT — Pacific American Steel Iron Corp., c/o T. Smith, County-City Bldg., Seattle, steel plant. $50,000,000. RFC funds sought.

B. C., Vancouver—PLANT—Federal Iron Wks. Ltd., 1015 Rogers Bldg., plant $40,000.

B. C., Vancouver—MILL—Fraser River Timber Co., Ltd., 207 W Hastings St., saw mill and factory. $50,000.

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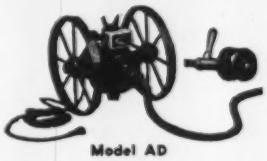

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ENGINEERING NEWS-RECORD
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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

B. C., Vancouver—PLANT—Fraser Valley Fibre Flax Co-operative Assn., Surrey, scrutching plant. $40,000.

B. C., Vancouver—SHINGLE MILL—Hammond Logging Co. Ltd., 470 Granville St., shingle mill, etc. $40,000.

B. C., Vancouver—PLANT—L'Air Liquide Society, Ltd., 1111 Beaver Hall Hill, Montreal, Que., plant. $75,000.

B. C., Vancouver—SAW MILL—Alice Lake Logging Co., Ltd., 1318 Standard Bank Bldg., saw mill, etc. $50,000.

N. S., Halifax—PLANT—Nova Scotia Light & Power Co., Ltd., Halifax, steam power generating unit, 10,000 kw. capacity. $90,000.

N. S., Port Williams—PLANT—L. Fairn, archt., Wolfville, bids soon rebuilding apple dehydrating plant for Nova Scotia Apple Marketing Bd., Kentville. $50,000. CD 6/29—ENR 7/9.

Ont., Blenheim—PLANT—Eastern Canning Co., Ltd., 7 Queen St., Chatham, plant reconstruction, addn.

Ont., Campbellford—PLANT—Gravlin-Bale, Ltd., Campbellford, reconstructing, addn. shoe plant. $50,000.

Ont., Chippawa—PLANT—Norton Co., Ltd., Chippawa, plans by Prack & Prack, 36 S. James St., Hamilton, plant addn. $60,000. CD 6/4.

Ont., Coldwater—PLANT—Certified Public Building, 107 E. Front St., Toronto, remodeling, exten. plant. $50,000. Jacobs & Dawson, 107 E. Front St., Toronto, engrs. CD 8/13.

Ont., Cooksville — PLANT — Ward Electric Laboratory, 21 Dundas St., plant. $50,000.

Ont., Ekmira—PLANT—Link-Belt Ltd., 791 Eastern Ave., Toronto, plant addn. $40,000.

Ont., London—BOILER SHOP—E. Leonard & Sons, 330 York St., bids soon 50x52x220 ft., brick, steel boiler shop. $150,000.

Ont., Onakawana—BOILER BUILDING, etc. —Temiskaming & Northern Ontario Ry., S. B. Clement, ch. engr., North Bay, bids soon boiler and processing bldg., water tank, housing, garage, bunk house, etc. $200,000.

Ont., Oshawa—PLANT—General Motors of Canada, Ltd., Oshawa, remodeling bldgs. $50,000.

Ont., Ottawa—PLANT—Modern containers, Ltd., 346 Queen St., 1 story, bsmnt., frame plant exten. $42,000.

Ont., Skead—MILL—M. J. Poupore Lumber Co., Ltd., Gogoma, bids soon sawmill, planer mill machine shop, blacksmith shop, water tank, garage, altering 4 staff bldgs., 16 workmens residences. $190,000. CD 8/13.

Ont., Toronto—PLANT—Perth Mica Ltd., c/o J. F. Boland, 217 Bay St., plant. $40,000.

Ont., Toronto — PLANT — York Brass & Aluminum Fdry. Ltd., c/o G. A. Martin, 320 Bay St., iron working plant. $40,000.

Ont., Whitby—MILL—J. S. L. McRae, Hay Lake, saw mill, etc. $40,000.

Ont., Whitby—FACTORY—Metcalfe Foods Ltd., Brock St., bids soon brick factory. $57,650. CD 7/8—ENR 7/16.

Ont., Windsor — PLANT — Sheppard & Nasson, archts., 52 Chatham St., W., bids soon plant for Bendix Eclipse of Canada, Ltd., 1473 Argyle Rd. $135,000.

P.E.I., Belle Creek—FACTORY—B. Compton Ltd., Belle Creek, reconstructing factory. $40,000.

Que., St. Jean des Piles — FACTORY — P. Cadorette, St. Jean des Piles, bids soon, canoe factory. $40,000. CD 8/7—ENR 8/13.

BIDS ASKED

Bids Asked September 1

New York — PLANT — Beck & Tinkham, archts., Bailey Bldg., Jamestown, 1 story, steel, concrete plant for Industrial Company. $250,000. CD 8/5—ENR 8/13.

Bids Asked

Que., Shawinigan Falls—PLANT—Shawinigan Chemicals, Ltd., Carbide Div., Transmission Ave., 1 story, bsmnt., 60x150 ft. and 23x27 ft. rein.-con., brick welfare bldg. $45,000. A Lacoursiere, 101 4 St., archt. CD 6/4.

CONTRACTS AWARDED

Calif., Eureka—CANNERY, etc.—Hallmark Fisheries, on Coos Bay, Charleston, Ore., cannery, wharfs, parking lot. Owner builds. Over $40,000.

Calif., Toyon—MILL—Blagen Lumber Co., Toyon near Andreas, 140x160 ft. frame, planing mill, to O. J. Scherer Constr. Co., Box 178, Angels Camp. Est. $50,000.

Connecticut—BOILER PLANT — Industrial Company, boiler plant, to J. Winkel Co., Inc., 148 Larchmont Ave., Larchmont, N. Y. $105,000. CD 8/17—ENR 8/20.

Conn., Hamden (br. New Haven) — MACHINE SHOP—High Standard Mfg. Co., 1337 Dixwell Ave., 1 story, part bsmnt., 130x130 ft. rein.-con. machine shop unit, No. 4 Plant, to Paterson Constr. Co., Inc., 66 Anderson St., New Haven. Est. $145,000. L. F. Caproni, 1221 Chapel St., New Haven, engr. Bids 8/12.

Ind., Connersville — FACTORY — Rex Mfg. Co., Connersville, 1 story, 100x125, brick, cement block factory, to Wm. J. Behlmer, Connersville. $41,490. Henkel & Hanson, 7 Thornburg Bldg., archts. Awarded 8/7.

N. J., Newark—FACTORY—Vero... chemical Co., 26 Verona Ave., altering ... story, brick factory, to Maintenance Eng... 46 Willet St., Bloomfield. $150,000.

Pa., Sheffield — PLANT — O'Conno... chine Co., J. M. O'Connor, mgr., Sheffield ... story, plant addn., day labor. $40,000, incl ...

Pa., Wilkes-Barre — PLANT — Wil... Barre Carriage Co., Horton and S. Frank... ts., 1 story, 30x82 ft. plant addn., separate ... acts. $40,000. CD 7/17—ENR 7/30.

R. I., Providence — BUS TERM... L — Rhode Island Bus Co., 400 Fou... St., 1 story, 65x100 ft., brick, steel bus ... inal, Fountain St., to Dimeo Constr. Co. ... West- minster St. Est. $40,000. Bids ... CD 8/11.

Wis., Green Bay—PATTERN and ... MILL— Waterways Eng. Corp., 1501 State ... 2 story, 40x204 ft. frame pattern and ... mill bldg., concrete fdn., day labor.

Notice to Readers

Please do not write for additional information on individual jobs. It is not possible to answer such letters.

All the information that it is permissible to release is reported in these pages.

Business News Department

ENGINEERING NEWS-RECORD

Ont., London—BOILER SHOP—E. Leonard & Sons, Col. E. I. Leonard, mgr., 330 York St., 1 story, 52x200 ft. steel, concrete boiler shops, to Hyatt Bros., 290 Egerton St. Est. $40,000. Awarded 8/13. CD 8/19—ENR 8/27.

Ont., Weston—PLANT—Massey-Harris Co., Ltd., 915 King St. W., Toronto, plant exten., Main St., N., to A. W. Robertson, Ltd., 57 Bloor St., W., Toronto, $350,000. CD 8/3—ENR 8/5.

Ont., Windsor—ROUNDHOUSE — Canadian Pacific Ry. Co., T. B. Ballantyne, dist. engr., Union Sta., Toronto, 30 ft. rein.-con. roundhouse addn., 1 story, 50x60 ft. brick machine shops and boiler house, to R. J. Wilson Constr. Co., 341 Tecumseh Blvd. E. Est. $50,000. Bids 6/27, awarded 8/19. CD 6/24.

Que., Montreal—PLANT—Sherwin-Williams Co. of Canada, Ltd., 2875 Centre St., reconstructing linseed oil plant to Foundation Co. of Canada, Ltd., 1538 W. Sherbrooke St. Est. $50,000. CD 8/10—ENR 8/13.

Que., Montreal—STORAGE—Imperial Tobacco Co. of Canada, Ltd., 3710 St. Antoine St., 1 story, 111x522 ft. storage bldg., to Deakin & Stewart, Ltd., 1440 St. Catherine St. W., Montreal. About $80,000. N. C. Jameson, c/o owner, engr.

Que., Noranda—MINE—Noranda Mines Ltd., Royal Bank Bldg., Toronto, Ont., addnl. mine bldgs., day labor. $50,000. Architect, c/o L. P. McLelland, Noranda.

Que., Ville La Salle—PLANT—Imperial Tobacco Co. of Canada, Ltd., 3710 St. Antoine St., Montreal, 1 story, 111x522 ft. wood frame plant addn., concrete fdn., to Deakin & Stewart Ltd., 1440 Ste. Catherine St. W., Montreal, $80,000. Est. $110,000. N. C. Jameson, c/o owner, archt. CD 7/8—ENR 7/16.

Que., Ville La Salle—PLANT—J. B. Williams Co. of Canada, Ltd., 9471 La Salle Blvd., plant, to W. H. Madigan, 2165 Clinton St., Montreal. $57,500.

"Por